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Bampton lectures

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THE CHART AND SCALE
OF TRUTH

BY WHICH TO FIND THE CAUSE OF ERROR

LECTURES READ BEFORE THE
UNIVERSITY OF OXFORD AT THE LECTURE FOUNDED BY
THE REV. JOHN BAMPTON M.A.

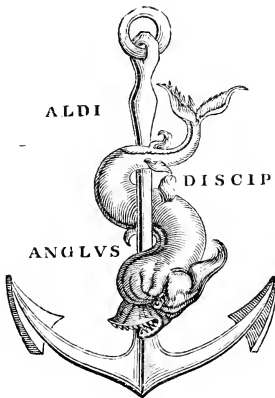
BY EDWARD TATHAM D. D.

LATE RECTOR OF LINCOLN COLLEGE OXFORD

A NEW EDITION REVISED CORRECTED AND
ENLARGED FROM THE AUTHOR'S MANUSCRIPTS WITH
A MEMOIR PREFACE AND NOTES

BY E. W. GRINFIELD M. A.

LATE OF LINCOLN COLLEGE



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TO
THE HEADS OF COLLEGES.

RIGHT REVEREND AND REVEREND SIRS,

I APOLOGIZE, as I ought to do, for the delay in printing these Lectures, by saying, that, when I had the honour to be appointed by you, my particular engagements, beside my ordinary employments, were so many, that I could not take my subject till January, 1789; that some of these engagements continued upon my hands, all the ensuing spring; and that, after I had finished at St. Mary's, some important concerns called me away the whole summer, to a distant part of the kingdom. On account of the haste in which they were composed, I wished to revise them, and found the subject increasing upon me, in every page.

Such as they are, I now beg leave to present them to you, in a form, which, I judge, will give my extensive subject the best advantage, accompanied with a hearty wish for your health and prosperity in all things ; that you may see the arts and sciences, virtue, religion, and all good learning flourish under your auspice ; that, as your University improves in splendour, it may advance in reputation ; and that, as it is the first in ornament, it may be the first in discipline.

I am, Gentlemen,
your most obliged,
and obedient Servant,

THE AUTHOR.

LINC. COLL. July 10, 1790.

*Extract from the last Will and Testament of
the late Reverend JOHN BAMPTON, Canon
of Salisbury.*

“ I direct and appoint, that the eight Divinity Lecture Sermons shall be preached upon either of the following subjects—to confirm and establish the Christian faith, and to confute all heretics and schismatics—upon the Divine Authority of the Holy Scriptures,” &c.

P R E F A C E.

A NEW edition of “The Chart and Scale of Truth” was long and earnestly demanded, during the life of its learned author, but, through what he confesses “his native indolence,” he never submitted to the labour of carrying it through the press ; yet he appears to have constantly kept this object in view, for he has left a copy of his work, so much enlarged and altered, as in some measure to give it the character of a new publication.

It is from this enlarged and corrected copy the present edition has been taken ; but the Editor has felt it his duty to exercise his discretion in the choice of the materials. The notes and observations appear to have been written at different intervals, during many years ; several are

duplicates, with more or less variations, others are unfinished, and nearly all are left for future consideration and improvement. Under these circumstances, the editor was intrusted with a discretionary power to omit or admit whatever he might deem expedient; and he has endeavoured to exercise this discretion, according to the best of his judgment.

The author, as it would appear from his manuscripts, was desirous that, in any republication of the "Chart and Scale," it should assume the aspect of a distinct logical treatise, and resign all appearance of Bampton Lectures. But this design was not sufficiently matured to warrant the Editor, in bringing out the work, in this independent form. He has therefore still allowed it to retain its original character; but to render its arrangement, as a treatise of logic, somewhat more complete, it has been found necessary to arrange several of the earlier lectures, as a general introduction; and to throw the two last chapters of the first volume, into the form of an appendix.

The principal new matter consists of the chapters on metaphysics, which have been retrieved from the author's manuscripts, but there is scarcely a page, in which, some additions or alterations may not be discovered. Many of these respect merely the style, which, it must be admitted, is somewhat harsh and obscure, whilst others are enlargements or illustrations of the argument. There are also considerable omissions, relating to temporary topics, long since passed away. For some of these, the Editor has the authority of Dr. Tatham; for others, he is himself responsible, unwilling to perpetuate forgotten controversy, or to reiterate charges, which can no longer be sustained. The copious table of contents and general index will be found of unquestionable utility to the scientific student.

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MEMOIR
AND GENERAL INTRODUCTION.

OF Edward Tatham, the learned and acute author of the present work, we have few biographical materials. He was a native of Yorkshire, as appears from the register of his baptism in the parochial chapelry of Dent, in the parish of Sedbergh, dated October 1, 1749, and the son of James Tatham, gentleman, to whom he affectionately inscribed his volume of Discourses, introductory to the Study of Divinity, published in 1780. It was no ordinary gratification to an aged parent to receive such a token of filial gratitude and intellectual ability.

He was educated at Sedbergh Grammar School, under the care of the Rev. Dr. Bate-
man, who appears to have been a teacher of uncommon worth. Dr. Tatham, in his

affectionate manner, always termed him, in his Yorkshire accent, "*Ould Bateman,*" and Dr. Haygarth of Bath, who was also one of Dr. Bateman's pupils, appears to have retained the same grateful recollections of his early instructor. To all, who can enter into the feelings of grateful pupils desiring to record the merits of their old schoolmaster, it will give pleasure to read the letters, many years afterwards written by Dr. Haygarth to Dr. Tatham, which are placed in the appendix to this short memoir¹. He was admitted of Queen's College, 1769, and took deacon's orders in 1776, and priest's in 1778. On his first taking orders, he undertook the curacy of Banbury, where he published the sermons already mentioned. Whilst resident at Queen's, the fire, in 1779, which consumed a considerable part of the college, destroyed his books and some of his manuscripts. The materials on which the Chart and Scale of Truth is founded

¹ Dr. King, the late Bishop of Rochester, was also educated at Sedbergh, and was the contemporary with Dr. Tatham.—See Appendix, No. 1.

are yet in existence ; but no place or date is mentioned, by which it can be ascertained, where or when they were put together. In 1781, he was elected fellow of Lincoln College, and became the acting tutor. It was during this period he preached the Bampton Lectures, the first volume of which was published in 1790, and the second in 1792. In March, 1792, he was elected Rector of Lincoln College, on the decease of Dr. Horner.

His powerful mind was not confined to theological inquiries ; he took an active interest in the political questions of that critical period. In 1790, he published a remonstrative Letter to the Revolution Society, and in the year following, a Letter addressed to Mr. Burke. But it is unnecessary to particularize his various minor publications, as a list of their titles is subjoined to this brief memorial.

On the election of Dr. Tatham to the rectorship, he became possessed of a handsome income, which he very liberally expended in improvements on the rectorial houses at Combe and Twyford. At a

later period, he was a munificent contributor to the improvements in the college, where he was enabled to display his architectural attainments.

In 1801, he married Elizabeth, daughter of John Cook, Esq., of Cheltenham, by whom he had no issue. She still survives, to revere his memory, and lament her loss.

He retained his health and vigour of mind and body to an advanced age, but when infirmities came upon him, he remained, for the most part, in the rectorial house at Coombe; where, by the statutes of the College, he had a right of residence. The new front of this house was built by Dr. Tatham with much skill, in the Gothic style, at a considerable expense; Coombe being indeed his favourite residence, and he died there, April 24, 1834, in the eighty-fifth year of his age. Some of his last expressions testified his firm reliance on the merits of his Redeemer. His remains were, at his own request, deposited in the collegiate church of All Saints, Oxon, and an expressive, though not flattering

likeness has been put up in the hall of Lincoln College.

In the general character of his mind, as well as in the style of his writings, Dr. Tatham perhaps approached to the genius of Warburton, more than to that of any other writer. Throughout the *Chart and Scale of Truth* may be discovered many of the “*disjecta membra*” of that original, but eccentric author. There is much of the same rough, unpolished strength in his language, and his kindred attachment to Warburton, may be discovered also in his frequent reference to the *Legation of Moses*².

² In his exterior manners and address, Dr. Tatham had many of those peculiarities, so often incidental to men of genius, which result from living in a kind of intellectual world of their own. He was rather negligent of those official forms which are the ceremonials of a university. It can scarcely be wondered, therefore, that he never served the office of vice-chancellor. But it may be confidently stated, that he was far above any feelings of envy or malignity, however the pungency of his language might occasionally offend. Two anecdotes, strongly characteristic, it may not be amiss to introduce:—At the great entertainment given to the allied sovereigns, at the peace, in the Oxford Theatre, the first toast proposed by the Prince Regent was “the King.”—Dr. Tatham immediately arose, and begged to remind his royal highness they always drank in that university—“Church

Having given this short account of a great and good man, we now propose to furnish the reader with a brief introduction to the work, by which Dr. Tatham will be hereafter chiefly remembered, and this is the more necessary, on account of a certain want of arrangement, which may

and King." The prince, with his well known politeness, acknowledged his error, and the toast was given accordingly. —The other is of a higher order. On one of those college festivals, called *gaudies*, a number of the undergraduates had kept their ovations to a late hour, and becoming somewhat noisy in their mirth, the rector sent his old servant to desire them to separate. Not obeying the mandate, he sent a more peremptory order; this so exasperated two of the party, who were the most excited, that they rushed out of the room, and following the servant into the lodge, commenced a violent assault on the rector's person. Such an outrage they inferred would lead to their summary expulsion; accordingly they rose early and cancelled their names on the college buttry book, and were about to take their departure. Dr. Tatham, knowing their fortunes in after life would be seriously injured, sent for them, and after a suitable reprimand, thus addressed them:—"Gentlemen, your names can only remain on the books, on these conditions: you are to be strictly confined to the college during the next vacation. As to you, Mr. — who are intended for the law, I require that you furnish me with a comprehensive analysis of Blackstone's Commentaries, and you, Mr. — who are for the church, must furnish a similar analysis of Hooker's Ecclesiastical Polity." It is needless to say, they both gratefully acquiesced in these terms.—This anecdote may well stand in the stead of any laboured eulogium on Dr. Tatham's character.

be accounted for, in some degree, from the unfitness of the materials, as subjects of pulpit address.

“The Chart and Scale of Truth,” as Dr. Reid has justly remarked in his letter³ to Dr. Tatham, is essentially a system of logic, formed on the principles of Lord Bacon’s writings, and may be considered as a practical commentary on the “*Novum Organum*.” Not that he has followed Bacon in a servile and undeviating manner—for he has adopted his general divisions of mind from Aristotle—but that, in the general texture and composition of the work, it is based on that principle of induction, as opposed to syllogism, which constitutes the main distinction between ancient and modern science.

The primary and pervading principle of the entire work is this—that truth, though essentially the same and uniform in the Divine Mind, becomes varied and modified, as it passes through the human faculties—just as light receives a hue and

³ See Appendix, No. II.

colour from the medium through which it passes—and that, in this manner, truth may be considered as passing through the intellect, the will, and the imagination, and branching out into the various departments of mathematics, physics, metaphysics, morals, history, and poetry, demanding specific modes of reasoning and evidence, yet retaining a common resemblance, so that they may all and each be brought to bear upon the “*summum genus*” of knowledge,—the knowledge of revealed theology. This is the fundamental principle, which pervades the work, and if the reader keeps this in mind, he will find little difficulty, in mastering its details.

In working out this comprehensive problem, the author is first led to consider the principles of mathematical reasoning, which are strictly demonstrative, and which bear no relation to the principles of induction. He then remarks, that it was by a profound analysis of this mathematical reasoning, Aristotle discovered the method of syllogism, and that all syllogisms are reducible

to those of the first figure (*barbara*). Syllogism is properly and strictly only applicable to matters of pure demonstration ; that is, to the subject of pure mathematics. Hence he infers its comparative unfitness and incompetency to deal with subjects of probable and contingent truth.

Such is the master key to this new system of logic, and when properly examined, it will be found to explain all the controversies which have arisen between the advocates of the Aristotelian and Baconian systems. In matters of geometry and arithmetic no induction is required ; the truth is self evident and indubitable, it rests on definitions which can allow of no dispute or variation, and upon axioms which carry their own evidence, and postulates which are admitted the moment they are enunciated. To subjects of this purely theoretic kind, the syllogistic method of reasoning (into which all mathematical reasoning may be resolved) is strictly applicable ; but it is applicable only, under very great restrictions, to any other ; be-

cause all other kinds of truth refer to different states of mind, than that of pure intellect.

And hence it is, that logic, as Dr. Whately himself acknowledges, as an art, has nothing to do with the truth of the major proposition. This it always takes for granted, assuming its truth, like that of mathematics. But though the geometer may always safely assume his major premise, it is not so with the reasoner on other subjects. And hence it is, that syllogism becomes so totally inefficacious as the instrument of moral or theological reasoning.

The evil of the syllogistic logic consists, therefore, in attempting to apply the art of demonstrative reasoning, to subjects which do not admit of demonstration; and the consequence is, that all moral truths, which are screwed down by syllogism, are nothing else than so many identical propositions; the conclusion being nothing less than a repetition of the major proposition (which is always universal), under a specific form.

But, though not an instrument for the discovery of probable truth, it is contended

by many, that syllogism is an admirable instrument for the detection of error. It would indeed be invaluable, if such were the fact; but a few considerations may point out its very narrow limits even in this respect.

That we may convict opponents of paralogisms, or false syllogisms, by a proper use of syllogistic reasoning, there can be no question; but it is only an error of *form* that we can possibly detect. If we ascend to principles or premises, we must first descend to the method of induction; we can only examine universals, by an investigation of the particulars contained under them; but all major propositions may be considered as universals: consequently, all major propositions require to be examined by the inductive process. The errors, therefore, which can be detected by syllogism, are exclusively those which may arise in the use of syllogism. They respect not the truth of things, but the truth of words, the proprieties of language; thus far and no farther, the range of the syllogistic logic may extend. "The greater logic," says

Sir John Herschel, “ may be termed *rational*; whilst to the inferior department, which is conversant with words alone, the epithet *verbal*, may for distinction be applied⁴.”

And hence it is the application of syllogism can find little or no scope, in the progress of modern science, and that amidst all the brilliant discoveries of physics, chemistry, or geology, the inductive process is constantly brought into action, whilst that of syllogism is scarcely ever alluded to. But, what still further demonstrates its narrow limits is this—that the purely geometrical process, which can be reduced to syllogism, has itself been found somewhat too cumbrous for the complicated calculations of modern science. Had Newton or La Place confined themselves to the process of the ancient geometry, they could never have succeeded in their sublime discoveries. It is well known, that the celebrated Matthew Stewart did not succeed in employing the ancient geometri-

⁴ Prelim. Discourse to Nat. Philos. p. 19.

cal process to the interpretation of the Principia.—How deplorable then would be the attempt to demonstrate Newton, by the intervention of syllogism⁵.

But it may be thought, that it affords, at least, a useful discipline and exercise for the youthful faculties, and that, as such, even though its immediate benefits are tri-

⁵ To perceive the utter inutility of syllogism, whether on subjects of demonstrative or probable truth, it is only necessary to state, that, to demonstrate the first proposition of Euclid syllogistically, no less than eight syllogisms are required. Of these, the first four are conditional, which are to be reduced to *barbara* by four others, to convert the problem into a theorem.—See Whateley's Logic, book iii. chap. iv. sect. 6.

This *stultus labor ineptiarum* may, however, serve to convince the student, that Dr. Tatnam was not mistaken in his conjecture, that the invention of syllogism may be traced to the logical analysis of such geometrical problems. It may also convince him, how unprofitable it must be to apply this cumbrous machinery to the investigation even of the simplest mathematical process.—But let us suppose, that, instead of the A and B of geometers, or instead of a problem, demanding only one self-evident postulate and one equally self-evident definition, these eight syllogisms were constructed of propositions of probable or contingent truth: not only would the process be greatly protracted, but, at every step, some new objection might be taken, which would give birth to a new brood of syllogisms, and these might be multiplied almost *ad infinitum*. Such was the prolific study of the schoolmen, whose understandings were perpetually obscured with syllogistic fog, and whose tongues were kept for ages, by such a logic, in unceasing rotatory motion.

vial, it ought to be retained, for its tendency to expand or invigorate the intellect. To this, it would seem sufficient to reply, that the syllogistic logic produced no such beneficial result on the minds of those, who formerly cultivated it to the greatest extent; and that the experience of the middle ages will for ever demonstrate its futility, as an element of rational and intellectual education. But it may be questioned, whether, in the present state of science and literature, it is capable of improving the mental faculties, even to the limited extent, which it may be supposed to have attained, in another and very different stage of moral, literary, and philosophic intercourse. It has been acutely remarked by Dr. Reid, that the ancients, in their logical researches, attended only to *categorical* propositions, which have one subject, and one predicate, and of these, to such only, as have a general *term* for their subject; whereas the moderns have attended chiefly to *relative* propositions, which express a relation between two subjects, and these subjects always general *ideas*⁶.

⁶ See Chart and Scale, vol. i. p. 113, 114.

Now, it deserves consideration, whether, by this transfer of categoric to relative propositions, the entire value and propriety of the syllogistic logic has not been set aside on all topics of probable and contingent reasoning. The “dictum de omni et de nullo,” on which this whole logic is based, does not apply to the agreement or disagreement of *ideas*. It can serve only to elucidate propositions which are strictly categorical, which have one subject, one predicate, and which have for their subject, a general *term*. It cannot be brought to apply to propositions when compared with others, whose subjects are general and correlative *ideas*. Of such propositions, as Wallis has remarked, the test should consist in another axiom — “Quæ convenient in eodem tertio, convenient inter se.”

And this difference may serve to explain the extreme puerility of all the questions which can now be examined by the scholastic logic. It can be applied only to the most simple and categorical reasoning — to reasoning which carries with it its own evidence, and which approaches the simplicity of Euclid. As soon as any ques-

tion becomes complex or obscure, demanding the scrutiny and comparison of our thoughts, its utility, as a test, is destroyed ; it can only add to our difficulties, by contracting our attention to the terms, instead of expanding it over the whole compass of the reasoning. It is, in fact, incapable of measuring such modern inquiries ; and hence it was, that Locke, though he imperfectly understood the *rationale* of the ancient logic, perceived enough of its deficiency, to enable him to reject its claims, as an instrument for enlarging, regulating, or improving the human understanding.—But why should we invoke the spirit of the dead, or insult the corpse of that mighty monster, who once bestrode the world, “like a Colossus?” The scholastic logic has long since lost its sway. It now serves only “to point a moral or adorn a tale.” It has sweetened the pleasantries of Goldsmith, and heightened the satire of Swift.

In offering these observations, it is not my object to make any formal or preconcerted attack on that system of logic, which is still taught at Oxford ; but merely to justify the

principles of the work, which I have been requested to revise. It has long been my firm conviction, that the principles of this work are built on a basis, which can never be shaken; and that, when ancient prejudices have passed away, its merits will be felt and acknowledged, even by the *Alma Mater* of its author.

Be this as it may, the work now comes before the public, in an enlarged and improved form, as a practical comment on the inductive logic. In this respect, its merits were widely acknowledged on its first appearance. It is well remembered, that Mr. Burke called on Dr. Tatham, soon after its publication, and expressed himself in the highest terms of approbation. The letters of Dr. Reid and Dr. Doig⁷ will speak for themselves. The Editors of the *Encyclopædia Britannica*, in the article “Logic,” thus announce their obligation, and their opinion of its merits:—“This chapter is almost wholly taken from Dr. Tatham’s ‘Chart and Scale of Truth,’ a work, which,

⁷ See Appendix.

notwithstanding the ruggedness of its style, has so much real merit, as a system of logic, that it cannot be too diligently studied by the inquirer, who would travel by the straight road to the temple of science." These observations, which are principally applicable to the first volume, (in which the various kinds of truth relating to human science are explained) may also be partially transferred to the second, which relates exclusively to theology.—Theologic truth, according to Dr. Tatham, rests originally on our belief in the Divine veracity. Faith is the basis of its logic, but its external and internal evidences form the proper subjects of human reasoning and inquiry. He views it with Bacon—"tanquam portus et sabbatum humanarum contemplationum omnium." Whilst he allows it is more distinct and separate in the nature of its truth, than any of the human arts or sciences are from each other, and confesses the informality of its logical arrangements; he appropriately represents Theology, as their queen and potentate, to whom they all respectively subserve and

minister—"The virgins that be her fellows do bear her company."

Considered in its general character and design, "The Chart and Scale of Truth" may be viewed, therefore, as a practical and continuous comment on the *Novum Organum* of Bacon. It is its leading object to establish the value of the inductive principle, as opposed to the syllogistic. The one proceeds on the analytic, the other on the synthetic method. It is almost needless to observe, that whilst synthesis prevails in the works of nature, analysis should prevail in the studies of nature. All the works of nature and of art to be investigated with precision, require to be analyzed with precision, before they can be understood.

It is proper however to remark, that, in some of the strictures on Bishop Lowth, on the rules of biblical translation, and on the comparative value of the Hebrew and the Septuagint, many readers may be found to differ from the author. These are topics open to freedom of discussion, and, on which, some of the best and most learned men have entertained different opinions.

But, whatever be the agreement or disagreement of the reader on these secondary topics, the Editor feels no uncertainty, as to the general decision, on the high and original value of the entire work,—that it is one of those permanent productions, which will always retain its rank and station, in the library of the learned theologian. For himself, he deems it only an act of justice to acknowledge, that he owes much of the formation of those analogical studies, which have been his chief occupation through life, to the early study of this original treatise, in conjunction with the kindred works of Butler, Brown, Reid, and Stewart.

APPENDIX TO THE MEMOIR.

I.—LIST OF THE PUBLICATIONS OF THE AUTHOR.

- 1778. Essay on Journal Poetry, 8vo.
- 1780. Twelve Discourses, introductory to the Study of Divinity.
- 1789. The Bampton Lectures. The first vol. appeared in 1790, the second in 1792.
- 1790. A Remonstrance to the Revolution Society.
- 1791. Letters to Edmund Burke, 8vo.
- 1792. A Sermon before the University on Nov. 5.
- 1793. A Sermon suitable to the Times.
- 1798. Letter to Mr. Pitt on the National Debt.
- 1802. Plan of the Income Tax.
- 1807. Address to the Members of Convocation on the Statute for Public Examinations.
- 1811. Address to Lord Grenville on Abuses in the University.
- 1813. Oxonia Purgata.
- 18—. Oxonia Illustrata, treating of the Architectural Improvements of Oxford.
- 1816. Observations on the Scarcity of Money, and its Effects.

II.—DR. REID'S LETTER TO DR. TATHAM.

REV. SIR,

Oct. 1791.

SOME time ago, Dr. Doig of Stirling sent me your "Chart and Scale of Truth," as a present from the author. My best acknowledgments are due for so unexpected a testimony of your regard, and for the honour you have done to the short account of Aristotle's Logic. As I wished to read your book before I returned my thanks for the present, I have now also to thank you most cordially for the pleasure and instruction I have had by it. You call it very justly a new logic, and I think it is a sound logic; tracing distinctly the different regions of human knowledge, and pointing out the first principles, the kind of evidence and method of reasoning proper to each. I shall recommend it to our Professor of Logic, who, I doubt not, has the candour and the good sense to discern its merit, and will have the opportunity of making it known to many. Such a work might be expected from so able a disciple and admirer of Lord Bacon. I hope it will teach philosophers to give more attention to the instructions of that great reformer in philosophy, than they have done. Newton understood his merit, and traced with success the path he had pointed out; you will lead many others to do the same. That you may not understand this, as an unmeaning compliment, will you forgive me, Rev. Sir, mentioning one thing, wherein I do not perfectly go along with you? After giving just and liberal praise to the great man last mentioned, you seem to find fault with the forces he has introduced to account for the planetary motions, as things, which, without his intention, have given a handle to materialists, and which he

should have held forth only, as an hypothesis, for the benefit of calculation, and not as really existing in nature. I am humbly of the opinion, that, of all the followers of Bacon, Newton has most closely followed his rules, without deviating to the right hand or to the left. The two first books of the “Principia,” are properly called “Mathematical principles of natural philosophy.” The propositions are mathematically demonstrated, and nothing but mathematical principles are assumed, except the three laws of motion, which, as physical principles he took to be sufficiently confirmed by induction, by those who went before him. The third book is the application of those mathematical principles to physical astronomy. The rules of philosophizing laid down in the beginning of the third book, are, I think, as good a compound, as can be given, in so few words, of the *Novum Organum*. The phenomena are facts, and the propositions are deduced from those facts, by reasoning according to the rules laid down. The sum of this physical astronomy is, that by reasoning from facts, according to his rule of philosophizing, he extends to the heavenly bodies two laws of nature, or forces, which were before allowed to obtain universally in earthly bodies. These are the *vis inertiae* and the *vis gravitatis*. As to the handle given by these forces to materialism, is it not equally strong, when they are imputed to earthly bodies as when to the heavenly? If this be so, Galileo, Torricelli, Wren, Wallis, Huygens, &c. are the persons chargeable with giving this handle, and Newton only left it as he found it. But, to consider the forces themselves;—the *vis inertiae* Newton indeed thinks to be inherent in matter; but it means no more but passiveness, that matter perseveres in any state, in which, it is put, till by some impressed force it be made to change it. This seems to me, to be so far from giving a handle to materialists, that it is subversive of their whole system. A consistent materialist must hold, that every animal

on the face of the earth, and perhaps every vegetable, contradicts this law. Yet if it be not true, Newton's system is a rope of sand.—Perhaps it is the *vis gravitatis* that gives the handle. This Newton holds, not to be inherent in matter, but an impressed force; and he must necessarily do so, to be consistent; for if it were inherent, it would be evidently contradictory to the *vis inertiae*. Matter continues to be inert, even when its state is constantly changed by the force of gravity; being passive, it yields to every impression. As all action implies an agent, an impressed force implies some being that impresses it, either body or mind. If the impression be made by a body, that body must also have had its force impressed, and the chain of bodies impressed and impressing must end in some being, which has an inherent power of impressing motion upon matter, and, consequently, which is not matter. This, I think, is the fair conclusion from Newton's doctrine of gravity, the conclusion which he saw and intended; and it appears to be as unlucky a handle for the materialist as even the *vis inertiae*; indeed, these are so connected, that, though the *inertia* of matter does not imply its gravity, the impressed force of gravity implies its *inertia*.

Nor can I help thinking, that Newton had reason to hold forth his system, as the true physical principles of astronomy, and not barely as an hypothesis, by which the phenomena might be solved, and calculation assisted. He had learned from Bacon, to disdain as the fictions of men, hypotheses whose truth is not legitimately proved by induction from fact. This appears from his second law of philosophizing. If the heavenly bodies be inert and inactive, every change of their state from rectilinear motion, necessarily implies an impressed force, and an uninterrupted change implies a force uninterruptedly impressed. That such a force really exists in nature, and is not an arbitrary hypothesis, appears to be a

necessary conclusion, from these two premises; to wit, that matter is inert, and that the heavenly bodies move in curve lines. It is impossible to evade this conclusion, unless there be in nature a power of giving motion to matter, which is neither in the matter itself, nor external to it. There seem to me to be two ways, in which, Newton's system may be fairly, I do not say successfully, assaulted: one way is, by showing that his rules of philosophizing are not, in the present state of human nature, the only foundation, on which, a true system of physical astronomy can be raised. For this, Bacon, as well as Newton, is answerable, as the rules are the same in both. The other way is, by showing that his conclusions are not justly deduced from the phenomena of the heavens, according to those rules. For this, Newton alone is answerable.—He seems likewise to me, to have just stopped, where a natural philosopher ought to stop. Having traced the chain of natural and dependant causes, as far as he was able, and shown, that the highest link he was able to reach, still implied a higher, which must be either a natural and dependant cause, or the finger of God.

But your opinion of Newton's system does not affect your "Chart and Scale of Truth," nor does it affect the great regard and esteem, with which, I have the honour to be,

Rev. Sir,

Your very much obliged humble servant,

THOMAS REID.

III.—DR. HAYGARTH'S LETTERS TO DR. TATHAM.

REVEREND DOCTOR,

Bath, June 22, 1807.

THE just praise, with which, you have honoured the character of the Rev. Dr. Bateman in a late publication, could not fail to afford high gratification, to all his scholars. It has revived a wish, which I have often entertained, that his Latin and Greek phrase books might be published. They were composed, you know, of notes upon classical authors, to explain difficult and illustrate beautiful passages. Being the work of many years, by a man of uncommon learning, might not a monument be thus erected, which would be highly honourable to the memory of so excellent a school-master? Would not such a publication promote classical erudition, and afford very useful assistance to the upper boys of large schools?

I left Sedbergh school in 1759, and, soon after that period, my time and study have been chiefly employed on other, particularly, on medical subjects, so that I should be very ill qualified to publish such a work. Besides, mine are much less perfect, than future copies, as you may remember, that Dr. Bateman was constantly adding new annotations to his phrase-books. Your departure from Sedbergh was probably at least ten years later. Are you in possession of good copies of them, or can you find any, among your friends at Oxford?

If you approve this proposal, you will undoubtedly require, that the business should be executed, in a proper manner. For this purpose, may it not be necessary to engage a man of learning; first, to correct all the

numerous schoolboy *errata*, which the very best copies may probably contain, by a careful reference to all the original passages which are quoted? second, to make an index of all the authors, referring to all the passages explained in the order of their works, so that each phrase may be found, by the classical reader, without difficulty? I prevailed upon a young friend of mine to form such an index to my Latin phrase-book. Should not these phrase-books, with such corrections and indexes, be published in a small and cheap form, so as in both senses to fit a schoolboy's pocket?

Can you recollect any Sedbergh scholar, who would be able and willing to undertake the task of editor?

No attempt will be made to accomplish this proposal, without the approbation of at least one of Dr. Bateman's sons. I have already desired my friend, John Dawson, to communicate this plan to the Rev. S. Bateman, with whom you may probably be better acquainted than I am. With Col. Bateman I had become more intimate at Bath, but he is returned to India.

This address from an utter stranger might require many apologies. But my hope that you will pardon the liberty I have taken, is in the desire we mutually feel to advance the honour of our highly respectable schoolmaster, and to promote useful knowledge.

I have the honour to be,

Your very respectful and faithful servant,

JOHN HAYGARTH.

IV.

SIR,

Oxford, Aug. 13, 1807.

ON my visit to this place, it would have given me great pleasure to obtain a personal conference with you, on the business explained in the letter, which, though a stranger, I took the liberty to address you. Your full approbation of my proposal gave me great satisfaction. I have not yet received any answer to the request sent through Mr. Dawson to the Rev. S. Bateman. As he has the honour to be your friend, your recommendation may probably have much influence. I cannot think, that he can have any objection, to the publication of the Latin and Greek phrase books of his very learned and respectable father, if executed in a proper manner.

As I understand that you sometimes visit Bath, it would give me much satisfaction to have the honour of seeing you there, when we might more fully discuss this business.

I have the honour to be, with great respect,
Your obliged and faithful

J. HAYGARTH.

V.—DR. DOIG'S LETTER TO DR. TATHAM.

REV. SIR,

Stirling, Aug. 16, 1794.

As Mr. Ireland, a native of this country and an apothecary in your city, is returning directly to Oxford, I could not deny myself the pleasure of writing you a few lines by that conveyance. Perhaps you may recollect to have seen in Oxford, towards the end of June, 1791,

two Caledonians of a very different aspect; the one, a country squire, with rather a larger stock of erudition, than usually falls to the share of that species of beings on your side the Tweed; the other, a smatterer in Greek and Latin, and some other ancient languages. The former was a Mr. Ramsey, and the latter a Dr. Doig. The remembrance of your attention and civilities to my fellow-traveller and myself upon that occasion has brought this trouble upon you, which is, I beg leave to assure you, a tribute of the most sincere gratitude. Why this tribute was not paid sooner is another question. The reason was, the want of a commodious channel of conveyance, and, perhaps, because I could not think of troubling you with a letter, by the ordinary course, without having something to communicate of more importance than a mere compliment.

I spent an evening about a fortnight ago with your correspondent, Dr. Reid, of Glasgow, who still speaks in very high terms of your Bampton system of logic, and heartily wishes to see it generally adopted. He is a very old man, much bowed down and very deaf, but still enjoys a great share of health and vigour; and, as far as I can pretend to judge, the same strength of mind he did forty years ago.

You may probably have forgot, that when I had the honour of being with you at Oxford, you prescribed me, by way of task, to read Aristotle's Politics. This task I have performed most faithfully, and have, I think, reaped both pleasure and profit from the operation. That treatise is little known here. I fear the Egyptian priest's stricture upon the Greeks, recorded by Plato, will be too long applicable to my countrymen.

About two years ago (8vo. 1793), there was published a trifle of mine, under the title of "Two Letters on the Savage State, addressed to the late Lord Kaimes." They were patronised by the late Dr. Horne, Lord

Bishop of Norwich, who died, however, before it was published. Lord Kaims and the other demi-christians here maintain, that once upon a time all mankind were in a state of savagism. I endeavour to controvert this article. If you will give me leave, I shall transmit you a copy of it the very first opportunity. I have likewise written a dissertation on the origin of the tribe of the Greeks called Hellenes, which was read before the members of the Royal Society, Edinburgh, and is published in the third volume of their Transactions. A copy of it shall accompany

“ Beatus Fannius, ultro
Delatis capsis et imagine.”*

Mr. Ramsey is in tolerable good health and spirits. I believe he wrote to you by the same conveyance. He has not yet lost all hopes of seeing the Head of Lincoln College at his sweet villa, and regaling him with his various and delicious fruits, the produce of the neatest and most diversified garden in this country. In this case, I too should flatter myself with the hopes of an *en passant*.

Your goodness will excuse this enormously long scrawl, which shall end where it should have begun, that is, with congratulating you on your preferment, and sincerely wishing you long life, good health, and high spirits to enjoy it, and begging you will rest assured, that I am,

Rev. Sir, with the greatest respect,

Your most obedient humble servant,

DAVID DOIG.

* This alludes to a poem published (4to. 1796) by the Doctor, entitled, “ Extract from a Poem on the Prospect of Stirling Castle.”
— *Editor*.

VI.—DR. GEDDES' LETTER TO DR. TATHAM.

[The following short letter from Dr. Geddes, is too characteristic of the writer to be omitted.—*Editor.*]

REV SIR,

London, Jan. 21, 1794.

I HAVE just now received your very polite letter of the 18th of last December, with the acceptable present of your “Lectures.” I was not before a stranger to them, although my scanty purse had not been able to purchase them. I have read that part which you point out with much pleasure. We differ on some points: but I trust we shall always differ, as liberal and honest men ought to differ. To delineate the “Chart of Truth” is an arduous task, which few have accomplished so well as yourself; but still, I fear, Pilate’s query will occur, *τι εστιν αληθεια*. Relative truth is, I hope, not uncommon, but absolute truth is, perhaps, unattainable in this vale of tears. Be that as it will, your labours are extremely laudable, and must class you among the first scholars of the present age. Your name in the list of my subscribers is a great acquisition, especially at a time when bigotry, and something worse than bigotry, is trying to injure me. If Cooke have no copy let me know, that one may be sent hence. I have ordered my two last publications to be presented to you, and am, with very great regard,

Rev. Sir,

Your obliged humble servant,

A. GEDDES.

THE
CHART AND SCALE OF TRUTH,

BY WHICH TO FIND THE CAUSE

OF ERROR.

GENERAL INTRODUCTION.

SECT. I.

Of Truth in general.

WISDOM is a term which has a more limited and a more extended signification. Some of the ancient philosophers used it to express only a superior skill or proficiency in the arts¹; others raised it to the comprehension of the speculative sciences, whilst they excluded from its meaning all practical virtue, which, in their mistaken

¹ Τὴν δὲ σοφίαν ἐν ταῖς τέχναις, τοῖς ἀκριβεστάτοις τὰς τέχνας ἀποδίδομεν, οἷον Φειδίαν, λιθηρογόν σοφόν, καὶ Πολύκλειτον, ἀνδρῖαντοποιόν· ἐνταῦθα μὲν οὖν εἶθ' ἐν ἄλλο σημαίνοντες τὴν σοφίαν, ἢ ὅτι ἀρετὴ τέχνης ἐστίν.—Aristot. Ethic. Nicom. lib. vi. cap. 7.

estimate of the value of things, was to confer upon it, as they thought, the highest honour². But others, anticipating the superior dignity to which it was in future to be exalted, gave it a construction more enlarged and liberal; allowing it to embrace every virtue both of the heart and understanding, and making it to comprehend all moral as well as intellectual good³.

In this more comprehensive and exalted sense, wisdom was applied by the most illustrious of her children, who in his animated and almost enthusiastic descriptions, has adorned this queen of virtues with a splen-

² Εἶναι δὲ τινὰς σοφῆς οἰόμεθα ὅλως· ἢ κατὰ μέρος, ἢ δὲ ἄλλο τι ἢ σοφούς, ὡς περὶ Ὀμηρός φησιν ἐν τῷ Μαρκείῳ,

Τὸν δ' ἔτ' ἄρ σκαπτῆρα θεοὶ θέσαν, ἔτ' ἀροτῆρα,
Οὔτ' ἄλλως τι σοφόν.

ὡς τε δῆλον ὅτι ἡ ἀκριβειάτη ἀν τῶν ἐπισημῶν εἶη ἡ σοφία. δεῖ ἄρα τὸν σοφὸν μὴ μόνον τὰ ἐκ τῶν ἀρχῶν εἰδέναι, ἀλλὰ καὶ περὶ τὰς ἀρχὰς ἀληθεύειν. ὡς εἶη ἀν ἡ σοφία νῆς καὶ ἐπισήμη, καὶ ὡς περ κεφαλὴν ἔχουσα ἐπισήμη τῶν τιμιωτάτων. ἄτοπον γὰρ, εἴ τις τὴν ἐπισήμην πολιτικὴν, ἢ τὴν φρόνησιν σπυδαϊοτάτην οἶεται εἶναι, εἰ μὴ τὸ ἄριστον τῶν ἐν τῷ κόσμῳ ἀνθρώπος ἐσιν — Aristot. Ethic. Nicom. lib. vi. cap. 7.

³ Πᾶσα ἐπισήμη χωριζομένη δαικισύνης καὶ τῆς ἄλλης ἀρετῆς πανηγυρία, ἀλλ' ἢ σοφία, φαίνεται.—Plato in Menex. § 19.

Princeps omnium virtutum est illa sapientia quæ σοφίαν Græci vocant.—Cic. de Off. lib. i. cap. 43.

dour and magnificence of diction peculiar to himself, and celebrated her in terms of the sublimest eulogy:—"She is the brightness of the everlasting light, the unspotted mirror of the power of God, and the image of his goodness⁴." And the same extensive and divine prerogative was given to her by one who was wiser than Solomon, who was himself both the architype and exemplar of all good, "Christ the power of God and the wisdom of God⁵;" whose evangelical dispensation divides this universal virtue into two cardinal collateral and co-existent branches, truth and charity⁶, the foundation and the consummation of all things, corresponding to the two constituent parts of human nature, the intellect and the will, those singular and

⁴ Wisdom, vii. 26.

⁵ 1 Cor. ii. 24, and Luke, iii. 52.

⁶ Ὁ λόγος σὰρξ ἐγένετο—καὶ ἐθεασάμεθα τὴν δόξαν αὐτοῦ, δόξαν ὡς μονογενῆς παρὰ πατρὸς, πλήρης χάριτος καὶ ἀληθείας.—John, i. 14.

Ἡ χάρις καὶ ἡ ἀλήθεια διὰ Ἰησοῦ Χριστοῦ ἐγένετο.—John, i. 17.

Ἐν τούτῳ γινώσκονται πάντες ὅτι ἐμοὶ μαθηταὶ ἔσε, εἰάν ἀγάπην ἔχητε ἐν ἀλλήλοις.—John, xiii. 35.

Χάρις has a more extensive sense than *ἀγάπη*, and includes its meaning—*Gratia*, *beneficium*, sed in ea significatione quâ ponitur pro *amicitia* seu *benevolentia* fratrum geminorum. See Steph. Thes. Ling. Gr.

supereminent distinctions by which man becomes the subject of a religion which will make him wise unto salvation.

There is no expression by which our Lord presents himself and his holy gospel to our apprehension with a more intense devotion, or which he enforces with a stronger emphasis, than that of truth. “Sanctify them through thy truth. Thy word is truth⁷.” He joins it with life, as connected by a close and necessary tie, and as constituting the way which leads immediately to the end of his religion. “I am the way, and the truth, and the life; no man cometh to the Father, but by me⁸.”

Descended from a celestial parent, and allied to a sister of such purity and perfection, this branch of wisdom is a subject at all times most deserving our cultivation and regard, for its own sake, and more especially for the sake of Him who had all truth, who, “from his good-will to men,” hath given us

⁷ John, xvii. 17.

⁸ John, xiv. 6.

those sublime and supernatural portions of it, which are most accommodated to our necessities, and who, “knowing what is in man,” hath conveyed them to us in a manner by which we can receive and improve them to our best advantage. She is the brightest object and ornament of the understanding, as her sister Charity is of the heart.

To open this vast and important argument of truth in general, by a formal, and what is called a logical definition, would betray both ignorance and presumption, and promise little success in the conclusion. Aristotle indeed is said to have reproached Democritus as a teacher and philosopher, because he dealt in similitudes and analogies, and did not define and dispute in form⁹: and, under the sanction of his authority, the method of defining has been attempted by some philosophers, perhaps with more confidence than success¹⁰.

Truth is of the nature and essence of God, like him incomprehensible in the whole, and

⁹ Bacon. De Augm. Scient. lib. vi. cap. 2.

¹⁰ How imperfect and illogical is that of Wollaston! Def. 2. Sect. 1.

ineffable in its sublimer parts. It is more than the other attributes, it embraces and comprehends them all. For these and other reasons it cannot admit of an adequate definition. And who in the beginning of his researches, would presume to define that, which, after all his longest and best-conducted labours, he can only hope partially, and often imperfectly to comprehend; and of which an essential part can neither be directly expressed, nor directly understood¹¹? We may indeed esteem ourselves highly favoured by the Author and Finisher of all truth, if at the end of our researches, we shall be able any way to understand, in order to apply a few

¹¹ See Bp. Browne's "Divine Analogy," p. 84, who cites these remarkable words from Aquinas: "Intellectus noster, eo modo apprehendit eas (perfectiones), secundum quod sunt in creaturis, et secundum quod apprehendit, ita significat per nomina."

"What faculties other species of creatures may have to penetrate into the nature and inmost constitutions of things, we know not. This we know, and certainly find, that we want other views of them besides those we have, to make discoveries of them more perfect. The intellectual and sensible world are in this perfectly alike, that the parts which we see of either of them hold no proportion to that we see not; and whatsoever we can reach with our eyes, or our thoughts of either of them, is but a point in comparison of the rest."—Locke, *Hum. Und.* book iii. chap. 3.

particular portions and detachments of it, and to guard them from error and corruption.

When, upon a solemn occasion, the question was put to our Lord by a Roman governor, “What is truth?” though it was what he fully and perfectly knew, and what he came purposely and professedly to teach¹², he did not define it. He knew that definition was never the best method of instruction, and that, in its common use and application, it was seldom the friend of truth. Philosophically viewed, words do not constitute truth. They are only the vocal instruments by which it is communicated, or the written signs by which it is recorded. The latter are the daughters of earth, the former the sons of heaven. By an inquirer therefore things are to be examined, rather than words defined. By a teacher, things are to be conveyed by words in some form or other, which are doubtless to be explained to the understanding, if not sufficiently understood before. But explanation is one thing, and definition

¹² Καὶ εἰς τῷτο ἐλήλυθα εἰς τὸν κόσμον, ἵνα μαρτυρήσω τῇ ἀληθείᾳ. Πᾶς ὁ ὢν ἐκ τῆς ἀληθείας, ἀκούει μου τῆς φωνῆς.—
John, xviii. 37.

is another. Explanation is the first office of a teacher ; definition, if it be good, is the last of the inquirer, after the truth be found ; and is then the most advantageously employed by the teacher, when his previous instructions have prepared him for its possession.

But let us mark the conduct of the teacher professedly sent from God. Himself the fountain and conductor of truth, he is represented in the sacred oracles as the sun¹³, the fountain of light, and as the day-spring from on high¹⁴, the harbinger of light : and of these apt similitudes, familiar to all even without an explanation, which had been employed by Solomon in some of his sublime portraits of wisdom, He often availed himself, expressing truth by the significant emblem of “ light and the light of life.”

Whatever opinion therefore we may entertain of the doctrines and tenets of these two ancient philosophers, from the example of One who was wiser and “ greater ” than they, we may venture, in the present instance, to prefer the native of Abdera to the

¹³ Psa. lxxxiv. 11. Mal. iv. 2.

¹⁴ Luke, i. 78.

master of the Lycæum: and, instead of instituting the present investigation, by vainly attempting to define, it may be safer to follow the example of Him, who, in manner as well as in matter, was infinitely above the Stagyrice, and to avail ourselves of this similitude, as a fit illustration of truth in general.

God is supremely a Mind, and truth is consequently an attribute of mind.

To the sun “declaring at his rising a marvellous instrument¹⁵,” He, “by whom all things were made¹⁶,” hath delegated the power of enlightening the material system; whilst he hath reserved to Himself the office, which is more suitable to his nature, of giving light and knowledge by his eternal truth to the mind of man. But, whether he act through the instrumentality of his creatures, or more immediately from himself, he is uniform and consistent in his operations, so that one part of his divine economy is always illustrative of another. As the sun sheds his light over the material creation to

¹⁵ Eccles. xliii. 2.

¹⁶ John, i. 3.

be apprehended by the eye, truth is the light shed down from heaven to be apprehended by the intellect, given to illumine every subject natural and moral, corporeal and spiritual, so far as they are qualified by their different natures to convey it to the human mind; or rather, perhaps, so far as the human mind is qualified to receive it from them. For the difficulty of truth does not exist so much in the subjects, as in ourselves; and truths, which are the strongest in themselves, may sometimes shine upon our minds with the weakest force¹⁷.

¹⁷ "Ἰσως δὲ καὶ τῆς χαλεπότητος ἕσης κατὰ δύο τόπους, ἓκ ἐν τοῖς πράγμασιν, ἀλλ' ἐν ἡμῖν τὸ αἴτιον αὐτῆς. ὥσπερ γὰρ καὶ τὰ τῶν νυκτερίδων ὄμματα πρὸς τὸ φέγγος ἔχει τὸ μεθ' ἡμέραν, ἔτω καὶ τῆς ἡμετέρας ψυχῆς ὁ νοῦς πρὸς τὰ τῆ φύσει φανερώτατα πάντων.—Aristot. Metaph. lib. ii. cap. 1.

De causa difficultatis in veritatis cognitione discrepantes sunt sententiæ: alii enim res ipsas hujus difficultatis causam esse, alii nos ipsos esse censent. Heraclitus et Academici omnes res fluxas et caducas nullamque omnino stabilem et immutabilem esse putarunt, et in rebus ipsis difficultatem possuerunt. Alii, omnem veritatis difficultatem in imbecillitate nostri intellectus habuerunt, hisce nisi argumentis: "Siqua res esset cognitu difficilis, ea esset talis respectu cujuscunque intellectus; sed ratione divini Intellectus nulla res sit cognitu difficilis." Et "Quicquid per se tale est, id ea re non est difficile tale." Sed intermedia sententia recipienda est, Quod difficultas cognoscendæ veritatis partim ad nos, partim ad res ipsas referenda sit.—Joan. Ludov. Havenreuterus Com. in Aristot. Metaph. lib. ii. cap. 1. 8vo. *Francf.* 1604.

Thus from the Divine mind, truth becomes an attribute of the human, and must be in proportion to the mind in which it is ; and, from a comparative view of these different minds, so far as we can judge of them, however imperfectly that may be, assisted by this scriptural similitude of light, we may hope to arrive at a general conception of truth, as it relates to man.

In the Divine mind, which pervades and comprehends all things, truth is universal (allowing for the inadequate comprehension of our ideas and words when applied to the Deity) ; in the human, which, though it be capable of enlargement from the body, and can reach to distant times and places, is not of all times and places, it is partial ; as the light of the sun, by the rotation of the earth, is to the human eye. For, whereas our minds are only in particular places at particular times, it is the sole prerogative of the Divine to be present in all places and at all times. In the Divine mind, which is separate and distinct from body, it is immediate and intuitive ; in the human, which is joined

by a mysterious union with the body, it is mediate and progressive, advancing from the information of the senses through the operations of the intellect, like the gradual dawn of light. In the Divine mind, which is simple and uncompounded, it is of equal force; in the human, which is composed of different faculties adapted to different subjects, it is of different degrees and kinds, according to the difference of its faculties and the subjects presented to them; as the light is varied into many degrees of shade and colour, according to the different media through which it passes. In the Divine mind, which is pure, it is unerring and infallible; in the human, which is corrupt, it is subject to error, as the pure light of the sun is darkened and obscured by the grosser exhalations of the earth. But as the Divine mind is incapable of change, so also hath he formed the human the same in all men and nations, in reference to general truths and faculties; so that whatever be the imperfections or shades of any truth as relative to men, it is essentially immutable, that is, absolute and opposite to falsehood, as “darkness to light, and light to darkness.”

Thus of truth, which, in its omniscient fountain, is universal, immediate, equal, and infallible, from the infirmity and inferiority of their nature, men are only blessed with a partial, progressive, various, though immutable ray, which is obstructed by passions, prejudices, habits and vices, the causes of error, as clouds and vapours obscure the sun. Yet partial and imperfect as it is, truth is the greatest gift which God could bestow, or man receive—but it is not bestowed on us, even thus partially and imperfectly, on unconditional terms. It is hidden in darkness, and involved in difficulties, intended like all the other gifts of heaven, to be sought and cultivated by all the different powers and exertions of human reason.

The love of truth is accordingly one of the strongest passions of the mind, a stimulus¹⁸ which prompts it incessantly to its sublimest exercise; and the investigation of its various

¹⁸ Ὁρεξίς διανοητικῆ, ἧς τὸ εὖ καὶ κακῶς, τὸ ἀληθές καὶ ψεῦδος. —Aristot. Ethic. Nicom. lib. v. cap. 2. εἶθ' ἐν ἀνθρώπῳ λαβεῖν μείζον, ἢ χαρίζεσθαι Θεῷ σεμνότερον ἀληθείας. — Plutarch.

kinds, whether they rest in contemplation¹⁹, are applied to action²⁰, or operate in effect²¹, is the most honourable employment of human life. This honour, to which all who have leisure and opportunity should ambitiously aspire, is enhanced three ways ; by the utility of the truth in question, by the assiduity and ability employed to overcome the difficulty of the search, and by the willingness with which, when found, it is received and adopted ; forming together an exalted union of intellectual and moral virtue. One, who was the most highly honoured of earthly potentates, could withdraw from the splendour of his riches and the glories of his crown, as a candidate for the higher honour of cultivating this wisdom, and of ministering in all her provinces. “ The glory of God,” says Solomon, “ is to conceal a thing ; and the honour of the king to search it out²².”

Conscious however of the fallibility which attends the best exertions of human reason,

¹⁹ Ἐπιτήμη.

²⁰ Πράξις.

²¹ Πόλιςτις.—Aristot. Ethic. Nicom. lib. vi. cap. 3, 4.

²² Proverbs, xxv. 2.

sensible of the darkness under which the Author of all truth hath left some of its most interesting and important parts, and convinced withal, that as the search of it is the duty, so the invention will be the happiness of man, the honest and ingenuous inquirer will enter upon the task with humility, with diligence, with desire, and all the best affections of heart and understanding, with hope, not unmixed with fear. There is but one path to truth, whereas error is open to a thousand ways, and is prepared, as an enemy in ambush, on all occasions, to turn him aside from the direct and successful road.

SECT. II.

Of Mind in general.

THE mind of which truth is an attribute, is not easily made the object of its own view and contemplation. By our consciousness, which is the first ground of judgment, incapable of being resisted or evinced by reason, aided by reflection, we are partially informed of the motions, capacities, and operations of that invisible agent; which, though removed from external sense and abstracted from common apprehension, has been analyzed and arranged in its faculties both by ancient and modern philosophers.

Taken in its largest comprehension, as the knowledge of abstract and separate substances, Aristotle raises the philosophy of mind above all other parts of learning. He assigns to it the investigation of the principles and causes¹ of things in general, and ranks

¹ Δεῖ γὰρ ταύτην τῶν πρώτων ἀρχῶν καὶ αἰτιῶν εἶναι θεωρητικὴν.—Aristot. *Metaph.* lib. i. cap. 2.

it not only as superior, but also as prior, in the order of nature, to the whole tribe of arts and sciences.

But “ what is first to nature is not first to man.” Nature begins with causes which produce effects. Man begins with effects and by them ascends to causes. Thus all human study and investigation proceed of necessity in the reverse of the natural order of things, from sensible to intelligible; from body, the effect; to mind, which is both the first and final cause. Now physic, being the name given by the Peripatetic to the philosophy of body, from this necessary course of human studies, some of his interpreters² called that of mind metaphysic³, implying also by the term, that its subject, being more sublime and difficult than any other as relating to universals⁴, the study of it would

² Alexander and Philoponus.

³ Τῶν μετὰ τὰ φυσικά. Cujus inscriptionis hæc ratio est, quod in hoc opere ea tractentur quorum theorea posterior est doctrinæ naturali saltem quoad nos, qui a corporum cognitione rerumque caducarum, in substantiarum immaterialium atque immortalium contemplationem provelimur.—Du Val. Synops. Doctr. Peripat.

⁴ Σχεδὸν δὲ καὶ χαλεπώτατα γνωρίζειν τοῖς ἀνθρώποις ἐστὶ

come most properly and successfully after that of physics.

Taking it however in its natural order, as furnishing the general principles⁵ of all other parts of learning, which descend from thence to the cultivation of particular subjects⁶, Aristotle himself called this the First philosophy; but, as its subject is universal being⁷, particularly mind which is the highest and most universal, he gave it also the appellation of the Universal Science, common to all the rest⁸: and, lastly, to finish his encomium of this First and universal philosophy,

τὰ μάλιστα καθόλου· πορρώτατῳ γὰρ τῶν αἰσθήσεών ἐστιν.—Aristot. Metaph. lib. i. cap. 2.

⁵ Ὑπολαμβάνομεν ἐν, πρῶτον μὲν ἐπίστασθαι μάλιστα πάντα τὸν σοφὸν ὡς ἐνδέχεται, μὴ καθ' ἕκαστον ἔχοντα ἐπιστήμην αὐτῶν.—Aristot. Metaph. lib. i. cap. 2.

⁶ Aristot. Metaph. lib. ii. cap. 1, 2.

⁷ Ἔστιν ἐπιστήμη τις, ἣ θεωρεῖ τὸ ὄν ἧ ὄν.—Aristot. Metaph. lib. iv. cap. 1.

⁸ Ἡ πρώτη φιλοσοφία καθόλου—πασῶν κοινή.—Aristot. Metaph. lib. vi. cap. 1.

Ut physica tractat res naturales et corporeas quæ materia constant et forma; sic metaphysica res incorporeas et materiæ expertes, quæ divinæ dicuntur.—Agit, primo, de ente generatim ejusque principiis, essentia scilicet et existentia et partibus, sive de summis generibus entis et categoriis, ut res sint sive partes entis; deinde, de substantia spirituali sive spiritu, et, ultimatim, de Deo.—Est scientiarum universalissima. Dissertit generatim per supremas causas et universales, primaque principia; unde nominata Sapientia et Prima Philosophia.—Du Val. Synops. Doct. Peripat.

he honoured it with the exclusive name of Wisdom⁹.

And though in his celebrated partition of the sciences, Lord Bacon has made the distribution of metaphysics somewhat differently from that of the old philosophers, he treats this First philosophy with the greatest respect and attention, calling it the general root or stem out of which the other parts of learning shoot into separate branches, viewing it in hopeful prospect, when more philosophically cultivated, as supplying a collection of axioms and universal propositions appropriated to no particular science, but of more general application, considering it as the parent of them all, declaring it transcendent, and calling it with Plato, the science of things divine and human¹⁰.

⁹ Primus philosophus res speculatur quatenus abstractæ sunt, ab omni nexu liberæ. Philosophia autem prima ea est quæ etiam sapientia dicitur, cujus ambitu omnes disciplinæ cinguntur. ἡ πολυύμνητος σοφία, ἣν καὶ αὐτὴν ἀπλῶς ἐπισήμην κλητέον, καὶ μάλιστα ἐπισήμην, ut inquit Themist. in 1 Poster. Ipsa enim tenet et speculatur primarias rerum causas.—Budæi Comment. in Ling. Gr.

Ἡ σοφία περί τινος αἰτίας καὶ ἀρχῆς ἐστὶν ἐπισήμη.—Aristot. Metaph. lib. i. cap. 1.

¹⁰ De Augm. Scient. lib. iii. cap. 1. See Plato in Thæet. and Cic. 2, Tusc. Quæst.

Mr. Locke has taken the most useful part of this fruitful field of ancient erudition, which forms the most difficult as well as the sublimest subject of investigation, and has descended, with peculiar genius and ability and a native strength of mind, to the analysis of the Human Understanding. And if this great philosopher had followed the example of the learned Cudworth in his Intellectual System, and built his work upon the foundation of the ancient metaphysicians, he would have added much to its merit and perfection, and have greatly enhanced that fame which it has already made immortal.

The study of this universal science or philosophy of mind, the seat of all learning and the storehouse of all truth, is both the first in dignity and the largest in comprehension. It is a study both deep and difficult; a study which has been too much conducted on false principles founded only in imagination, too long perverted and obscured by the subtleties of logic, and too often terminating in something more injurious to truth than mere refinement and speculation. When founded however on just

observation and sound reflection, and conducted by rational investigation, it is a study which paves the way to a more scientific and successful cultivation of all the other parts of knowledge¹¹.

Waving for the present the further pursuit of this fundamental science, this first philosophy, in its use or in its abuse, through the volumes of ancient and modern metaphysicians, and without descending to a more minute investigation of the human mind, that imperfect emanation of the Divine, it will be sufficient for the purpose of these Lectures that its general functions have been distributed into three different provinces:—the theoretic, the practic, and the poetic mind¹², which I shall otherwise express by the intellect, the will, and the imagination.

¹¹ Τὸ μὲν πάντα ἐπίσασθαι τῷ μάλιστα ἔχοντι τὴν καθόλου ἐπισήμην ἀναγκαῖον ὑπάρχειν. οὗτος γὰρ οἶδ' ἔπως πάντα τὰ ὑποκείμενα.—Aristot. *Metaph.* lib. i. cap. 2.

¹² Πᾶσα διάνοια, ἢ πρακτικὴ, ἢ ποιητικὴ, ἢ θεωρητικὴ.—See Aristot. *Metaph.* lib. vi. cap. 1, for the philosophical distinction between them.

Philosophia theoretica est cujus finis est veritatis nuda solaque contemplatio.

To each of these faculties, in their operation upon their respective objects external or

Philosophia practica cujus finis est praxis, id est actio interna, libera, ex electione profecta, et ad bonum directa.

Philosophia poetica cujus finis est poesis, id est effectio, seu actio externa.—Du Val. Synops. Doctr. Peripat.

Plato divided the mind into four faculties or affections, *νόησις, διάνοια, πίστις, εἰκασία*: intelligentia, cogitatio, fides, simulatio—correspondent to the different degrees of truth. *Νόησις ἐπὶ τῷ ἀνωτάτῳ, διάνοια ἐπὶ τῷ δευτέρῳ, τῷ τρίτῳ πίσις, καὶ τῷ τελευτάτῳ εἰκασία.*—De Repub. sub fine. This distribution is not however so well calculated to distinguish the several kinds, as *πίσις* has a common relation to all the kinds.

Lord Bacon makes his general partition of learning as it relates to the memory, the imagination, and reason. “*Partitio doctrinæ humanæ ea est verissima quæ sumitur ex triplici facultate animi rationalis quæ doctrinæ sedes est. Historia ad memoriam refertur, poesis ad phantasiam, philosophia ad rationem.*—*Neque aliâ censemus ad theologica partitione opus esse.*”—De Augm. Scient. lib. ii. c. 1.

And in the seventh book he refers morality to the will under the conduct of reason.

This distribution of our great philosopher and reformer of learning seems also to be imperfect; for reason is the general instrument of the mind common to all its faculties (and his words are “*ex triplici facultate animi rationalis*”), and common alike to all the kinds of truth or learning.

I have therefore preferred the distribution of the Peripatetic to those both of the Academic and English philosopher, as being more proper and distinct, and equally comprehensive; for under his division *διάνοια θεωρητική*, he classes all those parts of learning which do not belong to the other two. *Τρεῖς φιλοσοφίαι θεωρητικαὶ, μαθηματικὴ, φυσικὴ, θεολογική.*—Aristot. Metaph. lib. vi. cap. 1.

And for the same reasons I deem it much more just and philosophical than Locke’s Division of the Sciences in the conclusion of his Essay.

internal, truth in general divides into special relations, or correspondencies ; and the distribution of its several parts, forming the whole circle of learning divine and human, will be most naturally and philosophically made, according as they range under one or other of these general provinces of human intellect.

The universal science or philosophy of mind is the true foundation of the universal art or philosophy of logic, the organ or instrument, by which truth is to be found and cultivated in all different relations and correspondencies to the different parts or faculties of the mind, of which it is an attribute. And the general office of this logic or universal art is, first, to find and establish right principles ; secondly, to institute a right method of reasoning correspondent to the principles ; and, thirdly, to estimate the kind and value of the truth when found, whether it belong to the intellect, the will, or imagination.

SECT. III.

Of Principles in general.

THAT all truth of which the mind is capable, to whatever faculty it may relate, is derived from certain principles¹ or first and fundamental truths, which are the causes why other things are true, is a maxim older than the days of Aristotle, and in which all sound philosophers have necessarily concurred; since, by the contrary supposition, there could be no such thing as truth at all²:

¹ Πᾶσα διδασκαλία καὶ πᾶσα μάθησις διανοητικὴ, ἐκ προϋπαρχέσης γίνεται γνώσεως. Φανερόν δὲ τῆτο θεωρεῖσιν ἐπὶ πασῶν. αἶ τε γὰρ μαθηματικαὶ τῶν ἐπιστημῶν διὰ τῆτε τῆ τρόπε παραγίνονται, καὶ τῶν ἄλλων ἐκάσῃ τέχνων.—Aristot. *Analyt. Post. lib. i. cap. 1.*

Οὐκ ἴσμεν δὲ τὸ ἀληθὲς ἄνευ τῆς αἰτίας. ἕκασον δὲ μάλισα αὐτὸ τῶν ἄλλων, καὶ ὃ καὶ τοῖς ἄλλοις ὑπάρχει τὸ συνώνυμον, οἷον τὸ πῦρ θερμότατον. καὶ γὰρ τοῖς ἄλλοις τὸ αἴτιον τῆτο τῆς θερμότητος. ὡσε καὶ ἀληθέστατον τὸ τοῖς ὑσέροις αἴτιον τῆ ἀληθείῃσιν εἶναι. διὸ τὰς τῶν ἀεὶ ὄντων ἀρχὰς, ἀναγκαῖον αἰε εἶναι ἀληθεστάτας. οὐ γὰρ ποτε ἀληθεῖς, εἴδ' ἐκείναις αἰτιόν τι ἐστὶ τῆ εἶναι, ἀλλ' ἐκείναις τοῖς ἄλλοις. ὡσθ' ἕκασον ὡς ἔχει τῆ εἶναι, οὕτω καὶ τῆς ἀληθείας.—Aristot. *Metaph. lib. ii. cap. 1.*

² Aristot. *Metaph. lib. iv. cap. 4.*

for, as all the productions of the material creation owe their existence to seeds of one kind or other; so every true production in the intellectual system owes its existence to some sort of principles analogous to seeds.

But though all philosophers, who are in any respect entitled to that name, are unanimously agreed in the existence of such principles, as the only foundation of sound learning; it is amazing to reflect how widely they differ from each other in determining what they are. Almost every one who has embarked in the search of knowledge has exhibited a train of his own as the grounds of his future reasoning; and others refusing to admit them have, upon equal authority, substituted different ones in their room³. Aristotle himself, after refuting those of all his predecessors⁴ was the prolific father of various principles; and, collected from one or

³ Aristot. *Metaph.* lib. i. cap. 3—6, in which the Peripatetic delivers the different opinions of the ancient philosophers, Hesiod, Empedocles, Anaxagoras, Leucippus, Democritus, Pythagoras, Parmenides, Xenophanes, Melissus, and Plato.

⁴ Aristot. *Metaph.* lib. i. cap. 7.

other, their number, their variety, and their inconsistency are almost infinite.

Principles like seeds are of many and various kinds, and to canvass and examine them, to reduce them to simplicity and order, to arrange them into classes, and determine them with precision, is the first and most essential office of sound logic.

As they are indispensable to all truth⁵, *What are principles* is a previous question essential to the final and more comprehensive inquiry, “What is truth?”

Are they such axioms or universal propositions⁶ as those upon which Aristotle and the sages of antiquity erected sciences and systems, and such as our Newton established for his Principia? If this question be affirmed (and it cannot be denied), it will bring after it another of equal moment. Are these axioms such principles as are properly *first*;

⁵ Μάλιστα δὲ ἐπισητὰ τὰ πρῶτα καὶ τὰ αἴτια. διὰ γὰρ ταῦτά, καὶ ἐκ τῆτων τᾶλλα γνωρίζεται, ἀλλ' ὃ ταῦτα διὰ τῶν ὑποκειμένων.—Aristot. Metaph. lib. i. cap. 2.

Aristot. Metaph. lib. ii. cap. 2.

⁶ Καθόλου γὰρ μάλιστα, καὶ πάντων ἄρχαι τὰ αξιώματα εἶν.—Aristot. Metaph. lib. iii. cap. 2.

such as have the seed absolutely in themselves, that is, such as are derived from no others of any kind whatever by any act or process of reason ; such as, in the words of a late writer, “ are intuitively certain, or intuitively probable, and are known by a power of the mind which perceives truth not by progressive argumentation, but by an instantaneous and instinctive impulse ; derived neither from education nor from habit, but from nature ; acting independently upon our will, whenever the object is presented, according to an established law, and therefore not improperly called sense, and acting in the same manner upon all mankind, and therefore properly called common sense, the ultimate judge of truth⁷ ?” Or, are they the result of the laborious investigations, reasonings, and deductions of a few philosophers ? If the latter part of this alternative be true (and the Categories from which Aristotle formed his axioms, whether philosophically or not is here no question, as well as the Principia of Newton, have immortalized the

⁷ Beattie on Truth, p. 36 and 42.

fame of their inventors as splendid monuments of human reason;) there must be other grounds or evidences productive of intuitive certainty or intuitive probability, obvious, instantaneous, and incapable of being deduced by reason, which constitute the first principles from which these secondary ones are, by a process of reason, formed.

These primary principles (and they have surely the first title to the name of principles) are mentioned by the same author to be—the evidence of external sense; the evidence of internal sense or consciousness; the evidence of memory, and some others⁸.

This general division of principles into primary and secondary, original and derived, evidences and axioms, let the distinction be made in what terms you will, however novel it may sound, is, I hope, philosophically made⁹: and, if so, it will be found of great

⁸ Beattie on Truth, p. 43.

⁹ These original evidences are acknowledged by Aristotle in book ii. cap. 19 of the *Post. Analyt.* as the genuine foundation from which all axioms are derived: and though he chooses to reserve an equal honour to the latter, he

importance in the search of truth in general, as it will divide our reasoning, which should always be governed by the principles, into two direct kinds or methods.

SECT. IV.

Of Reasoning in general.

ALL truth, to whatever province or department of mind it bears a reference, is deduced from principles by an act of reason, the organ which is common to them all, and the distinguishing prerogative of human nature.

It is observed by the excellent Lord Bacon in his *Advancement of Learning*, that soundness of direction in the application of the means takes away error and confusion, and forms the principal of those general expedients

allows the former to be necessary to their existence. Ἄνάγκη ἄρα ἔχειν μὲν τινα δύναμιν, μὴ τοιαύτην δ' ἔχειν, ἢ ἐσι τέτων τιμωτέρα κατ' ἀκρίθειαν—δυνάμιν σύμφυτον κριτικὴν, ἣν καλῶσιν αἰσθησιν, etc.

by which every work must be successfully conducted¹.

To execute a work in the line of his profession with competent ability, the artist not only should understand the power and compass of his instrument, but the particular manner in which, according to the nature of his materials and the progress of the work it should be employed. And it is of equal moment for the philosopher to know the general power and compass of reason, the instrument of truth ; and also the particular method in which it is to be applied on different subjects, and in different stages of the investigation : because the want of a just attention to these fundamentals of sound logic has often misled the reasoner, increased his labour, and disgraced his learning.

A false estimate of reason heightened, as

¹ Merito primas tenet, Consilii prudentia et sanitas ; hoc est, monstratio et delineatio viæ rectæ et proclivis ad rem quæ proponitur, peragendam. “ Claudus enim (quod dici solet) in via antevertit cursorem extra viam : ” et Solomon perapposite ad hanc rem : “ Ferrum si retusum fuerit, viribus utendum majoribus : quod vero super omnia prævalet, est sapientia. ” Quibus verbis innuit, medii prudentem electionem efficacius conducere ad rem, quam virium aut intentionem aut accumulationem.—De Augm. Scient. lib. ii.

it has often been, into a wild conceit of its all-sufficiency, that it is itself the cause and the standard of all truth, is a fatal rock on which many adventurers in philosophy have either suffered shipwreck before they were well embarked, or else have been thrown out of the direct road, and left to the mercy of the waves to be tossed upon a tempestuous sea, by every blast of doctrine, into all the harbours round the world, except the right one. Supposing that from its own underived resources, by acting and reacting upon itself, reason can discover all truth of consequence to man, they totally mistake both its nature and office; as it is neither the original cause nor the standard of truth.

So far from being the cause of truth, it cannot penetrate into or even apprehend the essence or substances of things corporeal or mental². It can only pass over their surface to take account of their qualities, powers, properties, operations, and affections, which are the causes; and that not directly

² Internas substantias nullo sensu, nulla actione reflexa cognoscimus.—Newtoni Sch. Gen. sub fine Princip.

and of itself, but by the help of such evidence as nature has supplied, which is the standard of truth.

Reason consists of perception and judgment, and operates by comparison ; and its office is to judge of evidences, to form and to apply axioms, and to trace similitudes ; so that it is properly the organ or instrument of truth. And in the execution of its office, it acts liberally and impartially, when not perverted and abused, accommodating its method and operation to the principles and nature of the subject, whatever they may be, upon which it is employed.

SECT. V.

Of Reasoning by Induction.

EVERY thing in the universe whether of mind or body, however mixed with others, presents itself to our observation in its individual state; so that perception and judgment employed in the investigation of all truth have, in the first place, to encounter with particulars. With these reason begins or should begin her operations. She observes, tries, canvasses, examines, and compares them together, and judges of them by some of those native evidences and original lights, which, as they are the first and indispensable inlets of knowledge to the mind, we propose to call the *primary* principles of truth¹.

¹ Homo naturæ minister et interpres tantum facit et intelligit, quantum de ordine naturæ opere vel mente observaverit; nec amplius scit, aut potest.—Bacon De Interp. Naturæ, et Nov. Orig. lib. i. aph. 1.

Φανερόν δὲ καὶ, ὅτι, εἴ τις αἰσθησις ἐκλείπειν, ἀνάγκη καὶ ἐπισημνῆναι τινὰ ἐκλείπειναι, ἢν ἀδύνατον λαβεῖν—ἐπαχθῆναι δὲ μὴ ἔχοντας αἰσθησιν, ἀδύνατον. τῶν γὰρ καθ' ἕκαστον ἢ αἰσθησις.—Aristot. Analyt. Post. lib. i.

By such acts of observation and judgment, diligently practised and frequently repeated, exercised on many particular or individual subjects of the same class and of a similar nature, noting their agreements and marking the differences however minute, and rejecting all instances which, however similar in appearance, are not in effect the same, reason with much labour and attention extracts some general laws² respecting the powers, properties, qualities, actions, passions, virtues, and relations of things, which are the causes of discovering truth.

This is no hasty, premature, notional abstraction of the mind, by which images and ideas are formed that in nature have no existence. Nor is it a careless and partial enumeration and induction of a number of particulars negligently examined and carelessly applied, by which general propositions can be formed with any philosophical solidity. It is a rational, operative, experimental process³, instituted and executed upon the real

² Δῆλον δὴ ὅτι ἡμῖν τὰ πρῶτα ἐπαγωγῇ γνωρίζειν ἀναγκαῖον· καὶ γὰρ καὶ ἡ αἰσθησις ἔτω τὸ καθόλου ἐμποιεῖ.—Aristot. *Analyt. Post. lib. ii. cap. 19.* See *lib. ii. cap. 13.*

³ *Manus hominis nuda, quantumvis robusta et constans, ad opera pauca et facile sequentia sufficit: eadem ope in-*

nature and constitution of things. By this process, reason advances from particulars to generals, from less general to more general; till by a series of slow progression and by regular degrees, she arrives at the most general ideas, called forms or formal causes⁴. And by affirming or denying a genus of a species, or an accident of a substance, or of a class of substances through all the stages of the gradation, we form conclusions, which if logically drawn are axioms⁵, or gene-

strumentorum multa et reluctantia vincit. Similis est et mentis ratio.—Bacon. Nov. Org.

⁴ Qui formas novit, is, quæ adhuc non facta sunt, qualia nec naturæ vicissitudines, nec experimentales industriæ unquam in actum produxissent, nec cogitationem humanam subituræ fuissent, detegit et educit.—Ibid.

⁵ Axioms are the result of the most laborious and recondite learning, and that they should be firmly established, is an object of the first importance to the success of every branch of science. Lord Bacon therefore strenuously contends that they should never be taken upon conjecture, or even upon the authority of the learned; but that, as they are the general principles and grounds of all learning, they are to be canvassed and examined with the most scrupulous attention, “*ut axiomatum corrigatur iniquitas, quæ plerumque in exemplis vulgatis fundamentum habent.*”—*De Augm. Scient. lib. ii. cap. 2.* “*Atque illa ipsa putativa principia ad rationes reddendas compellere decrevimus, quousque plane constant.*”—*Distrib. Operis.*

That all axioms are intuitive and self-evident truths, is a fundamental mistake, into which Mr. Locke (*Essay*, book iv. chap. 7, sect. 1) and others (see *Ancient Metaphysics*, vol. i.

ral propositions ranged one above another,

book v. chap. iii. p. 389, and vol. ii. p. 335) have been betrayed to the great injury of science. This error has, I apprehend, been engrafted upon another equally prevalent, That mathematics is a system, or, at least, a specimen of universal reasoning; and, as mathematical axioms are presumed to be intuitive, they hastily presumed that all others were intuitive.

Mr. Locke was gifted with a strong mind, though not cultivated with much learning. In many parts of his Essay, he has shown himself an able metaphysician in the most useful part of that difficult science. He has however no where shown himself an able logician. He judged of the school-logic from its weak and useless effect in promoting the real interests of learning, and from its tendency to nothing but endless dispute and fruitless jargon. But though from a view of the end, he justly condemned the means, he did not understand them.

Surely he had neither read Aristotle nor Bacon, or he would not have discovered such a want of logical philosophy as this chapter of Maxims betrays; at the same time, that in the midst of so much darkness, like the sun from a cloud, his native strength of mind breaks out with this luminous sentence:—"In particulars, our knowledge begins, and so spreads itself by degrees to generals; though afterwards the mind takes the quite contrary course, and having drawn its knowledge into as general propositions as it can, makes those familiar to its thoughts, and accustoms itself to have recourse to them, as to the standards of truth and falsehood." Book iv. chap. 7, sect. 11.

He totally mistook the maxim of the schools, That all reasoning is *ex præcognitis et præconcessis* (Essay, book iv. chap. 2, sect. 8, and chap. 7). He seems indeed to have been unacquainted with the true philosophy of reasoning, and not to have understood the nature of those intermediate ideas to which he attributes the advancement of all knowledge, nor the true mode of their application; and he appears to have been mistaken in the nature of that agreement

till they terminate in those which are universal⁶.

Axioms thus investigated and established, are applicable to all parts of learning, and are the indispensable⁷, and the truly admirable expedients by which reason pushes on her inquiries in the particular pursuit of truth, in every branch of knowledge. The method of reasoning by which they are

and disagreement of ideas, of which he has said so much as the sole criteria of truth.

In the twelfth chapter of this book indeed he exposes the absurdity of taking axioms upon credit; but shows how little he understood of their use. His conception of the improvement of learning was very imperfect; for though he might understand the nature of physics, he was unacquainted with the philosophy of ethics and mathematics.

⁶ *Duæ viæ sunt atque esse possunt ad inquirendam veritatem. Altera a sensu et particularibus advolat ad axiomata maximè generalia, atque ex his principiis eorumque immotâ veritate judicat et invenit axiomata media: atque hæc via in usu est. Altera a sensu et particularibus excitat axiomata ascendendo continenter et gradatim, ut ultimo loco perveniatur ad maxime generalia; quæ via vera est et intentata.—Bacon. Nov. Org. lib. i. aph. 19. See also lib. i. aph. 102—107.*

⁷ *Τῶν ἀρχῶν δὲ αἱ μὲν ἐπαγωγῇ θεωρῶνται, αἱ δὲ αἰσθήσει, αἱ δὲ ἐθισμῶ τινί, καὶ ἄλλαι δὲ ἄλλως. Μεινῆσαι δὲ πειρατέον ἐκάστας ἢ πεφύκασι, σπυδατέον δὲ ὅπως ὀρισθῶσι καλῶς. Μεγάλην γὰρ ἔχουσι ῥοπήν πρὸς τὰ ἐπόμενα. Δοκεῖ ἔν πλείον ἢ τὸ ἥμισυ τῆ παντός εἶναι ἢ ἀρχῆ, καὶ πολλὰ ἐμφανῆ γίνεσθαι δι' αὐτῆς τῶν ζητημένων.—Aristot. Ethic. Nicom. lib. i. cap. 7.*

formed is that of true and legitimate induction⁸, which is therefore called by the best and soundest of logicians, the key of interpretation⁹.

If instead of taking his axioms out of the great families of the categories by an immediate and indolent extraction, and erecting them by his own sophistical invention into the principles upon which his disputation was to be employed¹⁰, the analytical genius of Aristotle had presented us with the laws of the true inductive logic by which axioms are philosophically formed, and given us an example of it with his usual sagacity

⁸ Inductionem censemus eam esse demonstrandi formam quæ sensum tuetur et naturam premit, et operibus imminet ac fere immiscetur.—Bacon. *Distrib. Operis.*

⁹ *Ibid.* Nov. Org. lib. ii. aph. 10.

¹⁰ Ex experientia arripiunt varia et vulgaria, eaque neque certo comperta, nec diligenter examinata et pensitata; reliqua in meditatione atque ingenii agitatione ponunt.—Hujus generis exemplum in Aristotele maxime conspicuum est, qui philosophiam dialecticâ suâ corrumpit, quum mundum ex categoriis effecerit, et innumera pro arbitrio suo naturæ rerum imposuerit, magis ubique sollicitus quomodo quis respondendo se explicet, et aliquid reddatur in verbis positivum, quam de interna rerum veritate.—Ille enim prius decreverat; neque experientiam ad constituenda axiomata rite consuluit; sed, postquam pro arbitrio suo decrevisset, experientiam ad sua placita tortam circumducit et captivam.—*Ibid.* lib. i. aph. 62, 63.

in a single branch of science¹¹; he would have brought an offering more valuable and acceptable to the temple of truth, than he effected by the aggregate of all his logical and philosophical productions.

It is after the inductive process has been industriously pursued and successfully per-

¹¹ Though in different parts of his works he gives a general idea of induction (*Ὁμοίως δὲ καὶ περὶ τοὺς λόγους, οἳ τε διὰ συλλογισμῶν, καὶ οἳ δι' ἐπαγωγῆς· ἀμφοτέροι γὰρ διὰ προγιγνωσκομένων ποιῶνται τὴν διδασκαλίαν· οἳ μὲν, λαμβάνοντες ὡς παρὰ ξυγιέντων· οἳ δὲ, δεικνύντες τὸ καθόλου, διὰ τῶ ἐδηλον εἶναι τὸ καθέκαστον.*—*Analyt. Post. lib. i. cap. i.* Ἐκ προγιγνωσκομένων δὲ πᾶσα διδασκαλία. Ἡ μὲν δι' ἐπαγωγῆς, ἡ δὲ συλλογισμῶν. Ἡ μὲν δὲ ἐπαγωγή ἀρχὴ ἐστὶ καὶ τῶ καθόλου. Ὁ δὲ συλλογισμὸς ἐκ τῶν καθόλου. Εἰσὶν ἄρα ἀρχαὶ, ἐξ ὧν ὁ συλλογισμὸς, ὧν ἕκ ἐστὶ συλλογισμὸς.—*Ethic. Nicom. lib. vi. cap. 3.*) from the whole of them, analytical, topical, and physical, it is clear he was very imperfectly acquainted with the particular philosophy of the inductive organon: and it is apparent from a passage in his Ethics (*μη λανθανέτω δ' ἡμᾶς, ὅτι διαφέρουσιν οἱ ἀπὸ τῶν ἀρχῶν λόγοι, καὶ οἱ ἐπὶ τὰς ἀρχάς. Εὖ γὰρ καὶ Πλάτων ἠπόρει τῆτο καὶ ἐζήτει, πότερον ἀπὸ τῶν ἀρχῶν, ἢ ἐπὶ τὰς ἀρχάς ἐστὶν ἡ ὁδός, ὡσπερ ἐν τῶ σαδίῳ, ἀπὸ τῶν ἀθλοθετῶν ἐπὶ τὸ πέρασ, ἢ ἀνάπαλιν. Ἀρκτέον μὲν γὰρ ἀπὸ τῶν γνωρίμων. Ταῦτα δὲ διπτῶς. Τὰ μὲν γὰρ ἡμῖν, τὰ δε ἀπλωσ. Ἴσως ἔν ἡμῖν γε ἀρκτέον ἀπὸ τῶν ἡμῖν γνωρίμων.—ἀρχὴ γὰρ τὸ ὅτι· καὶ εἰ τῆτο φαίνοιτο ἀρκέντως, ἐδὲν προσδέησει τῶ διότι.*—*Ethic. Nicom. lib. i. cap. 4.*) that he never put it in practice in the formation of his axioms and principles, which he chose rather to assume gratuitously, or to fabricate by his own invention. See *Analyt. Post. lib. i. cap. 24.*

formed, that definition¹² so pompously but prematurely, so formally but gratuitously affected by the old logicians and their disciples of the schools, may be logically and usefully introduced, by beginning with the genus, passing through all the graduate and subordinate stages, and marking the specific difference as it descends, till it arrive at the individual which is the subject of the question. By adding an affirmation or negation of the attribute of the genus, to the species or individual, or that of a general accident, to the particular substance so defined, and thus making the definition a proposition, the truth of the question will be logically solved, without any farther process¹³. So that instead of being the first, as employed by the logic in common use, definition should form the last act of reason in the search of all truth, except that which is strictly mathematical.

But we are now anticipating the subject of the following section.

¹² Δεῖ γὰρ ἐξ ὧν ὁ ὀρισμὸς, προειδέναι καὶ εἶναι γνώριμα.—
Aristot. Metaph. lib. i. cap. 7.

¹³ Aristot. Analyt. Post. lib. i. cap. 10.

SECT. VI.

Of Reasoning by Syllogism.

THESE axioms or general propositions thus inductively established, become another species of principles which may be properly called *secondary*, and which lay the foundation of another and different method of reasoning.

When these are formed, and not before, we may safely admit the maxim with which the old logicians set out in the exercise of their art, as the great hinge on which their reasoning and disputation turn,—from truths that are already known¹, to derive others which are not known. Or to state it more comprehensively, so as to apply to probable, as well as to demonstrative reasoning—from truths which are better known², to derive others which are less known.

¹ Ἐξ ἀληθειῶν καὶ πρώτων καὶ ἀμέσων καὶ γνωριμοτέρων καὶ προτέρων καὶ αἰτιῶν τῷ συμπέρασματος.—Aristot. Analyt. Post. lib. i.

² Ex præcognitis et præconcessis.

These known or better-known truths constitute those axioms or general propositions, the existence of which this other method of reasoning, not only requires, but of which it also demands a subordination and gradation. On these as principles, all its operations are founded, and on the truth and soundness of these its success must ultimately depend.

Philosophically speaking, this reasoning consists in reducing under general propositions others which are less general, or which are particular³, where the proof arises out of higher and more general propositions; since the inferior are only known to be true, as we trace their connection with the superior. For what is true of any whole class, must be true of all in that class; but the class itself must be pure and without any thing extraneous, and the particular truth which is to be proved must belong to that class, or the conclusion will be false. Logically speaking, it is to predicate a genus

³ Manifestum est artem judicandi per syllogismum nihil aliud esse, quam reductionem propositionum ad principia. —Bacon. De Augm. Scient. lib. v. cap. 4.

of a species, or individual contained and comprehended under it⁴, or an accident of the substance in which it is inherent⁵: for whatever, as a whole or genus, contains another, as a part or species, it communicates to it its nature and properties; and whatever common accident is actually inherent in a class of substances, it communicates itself in a logical sense, to every particular of the class. Therefore, when a question arises upon any subject, the inquiry is, What is true of the genus or family under which it classes? for that will be always true of it, whether a species or a particular and *vice versâ*, upon the great logical maxim, that what is true of the whole is true of all its parts⁶. Thus it is the business of syllo-

⁴ Καθ' ὑποκειμένου—Τῶν ὄντων, τὰ μὲν καθ' ὑποκειμένους τινὸς λέγεται, ἐν ὑποκειμένῳ δὲ ἕδενί ἐστιν. οἷον, ὁ ἄνθρωπος, καθ' ὑποκειμένους μὲν λέγεται τῷ τινος ἀνθρώπου, ἐν ὑποκειμένῳ δὲ ἕδενί ἐστιν. Aristot. Categ. cap. 2.

⁵ Ἐν ὑποκειμένῳ—τὰ δὲ, ἐν ὑποκειμένῳ μὲν ἐστὶ, καθ' ὑποκειμένους δὲ ἕδενός λέγεται· (ἐν ὑποκειμένῳ δὲ λέγω, ὃ ἐν τινι μὴ ὡς μέρος ὑπάρχον, ἀδύνατον χωρὶς εἶναι τῷ ἐν ᾧ ἐστίν·) οἷον ἢ τις γραμματικὴ, ἐν ὑποκειμένῳ μὲν ἐστὶ τῇ ψυχῇ, καθ' ὑποκειμένους δὲ ἕδενός λέγεται· καὶ τὸ τὸ λευκόν, ἐν ὑποκειμένῳ μὲν ἐστὶ τῷ σώματι, (ἅπαν γὰρ χρῶμα, ἐν σώματι,) καθ' ὑποκειμένους δὲ ἕδενός λέγεται.—Ibid.

⁶ Quod verum est de toto verum est de omni.

This is generally expressed by *dictum de omni*, a logical

gism to form under general propositions others which are less and less general, till we descend to the particular which is the object of our research. And here we arrive at the true foundation of that agreement and disagreement, which logically speaking constitute affirmative and negative truth.

This method of reasoning has obtained the name of Syllogism or Collection, which has been analysed by Aristotle in a minute and laborious process, with a wonderful degree of subtlety and acumen. He has exhibited it to view in every possible shape, enacted the laws by which it is to be governed, and invented all the modes and figures into which it may be cast. Such was the study which exercised the wits of all the schoolmen for nearly a thousand years.

axiom, that what is affirmed of the genus or whole, may be affirmed of all the species and individuals under it. And the opposite axiom is *dictum de nullo*, that what is denied of the genus or whole may be denied of its species or individuals. By these axioms all the modes of the first figure are governed, to which all the legitimate modes of the other figures are reducible.

Thus induction and syllogism are the two methods of direct reasoning corresponding to the two kinds of principles, primary and secondary, on which they are founded, and by which they are respectively conducted⁷. In both methods indeed reason proceeds by judging and comparing, but the process is different throughout. In the exercise of induction, the first thing is to perceive and to judge of particulars, from their respective evidence by single apprehension, as the senses do of objects. The next is to compare these judgments together by single and simple acts, and that immediately⁸, from the agreement of a number of which col-

⁷ Ὁμοίως δὲ καὶ περὶ τῆς λόγου, οἳ τε διὰ συλλογισμῶν, καὶ οἳ δι' ἐπαγωγῆς· ἀμφότεροι γὰρ διὰ προγνωσκομένων ποιῶνται τὴν διδασκαλίαν· οἳ μὲν λαμβάνοντες ὡς παρὰ ξυνιέντων· οἳ δὲ, δεικνύντες τὸ καθόλου, διὰ τῆ δῆλον εἶναι τὸ καθέκαστον.—Aristot. *Analyt. Post. lib. i. cap. 1.*

⁸ Ἐστὶ δὲ ὁ τοιοῦτος συλλογισμὸς τῆς πρώτης καὶ ἀμέσως προτάσεως.—Aristot. *Analyt. Prior. cap. 23.*

In arte judicandi, aut per inductionem aut per syllogismum concluditur. At, quatenus ad iudicium quod fit per inductionem, uno eodemque mentis opere illud quod quaeritur et invenitur et iudicatur. Neque enim per medium aliquod res transigitur, sed immediate, eodemque fere modo quo fit in sensu: quippe sensus in objectis suis primariis simul et objecti speciem arripit et ejus veritate consentit. Bacon. *De Augm. Scient. lib. v. cap. 4.*

lateral judgments, general ideas and propositions are derived. In the exercise of syllogism, the first thing is to compare by double and complex comparisons, through the help of a third or middle term severally applied to the two original terms of the question⁹, making two propositions called the premises. The second thing is to judge of these premises in order to collect a third proposition or conclusion, different from them both¹⁰. As therefore these methods of reasoning proceed on different principles, so are they not only different, but the reverse of each other¹¹; and, though it may have the sanction of Aristotle, an inductive syllogism¹² is a solecism.

Till general truths are ascertained by induction, these third or middle terms by which

⁹ Ὡν μὲν γὰρ ἔστι μέσον, διὰ τῶ μέσῳ ὁ συλλογισμὸς ὧν δὲ μὴ ἔστι, δι' ἐπαγωγῆς.—Analyt. Prior. cap. 23.

Aliter fit in syllogismo, cujus probatio immediata non est, sed per medium perficitur. De Augm. Scient. lib. v. cap. 4.

¹⁰ Συλλογισμὸς δὲ ἐστὶ λόγος, ἐν ᾧ, τεθέντων τινῶν, ἕτερόν τι τῶν κειμένων ἐξ ἀνάγκης συμβαίνει τῷ ταῦτα εἶναι.—Aristot. Analyt. Prior. lib. i. cap. 1.

¹¹ Καὶ τρόπον τινὰ ἀντίκειται ἡ ἐπαγωγή τῷ συλλογισμῷ, are the words of Aristotle himself. Analyt. Prior. cap. xxiii.

¹² Analyt. Prior. lib. ii. cap. 23.

syllogisms are made, are no where safely to be found ; for it is only by the middle terms and propositions taken from general truths, that less general or particular truths can be evinced¹³. “ The invention of the middle term or argument by induction, is therefore the one and first thing, and the judgment of the consequence, from the argument by syllogism, is the other and second¹⁴.” So that another position of the Peripatetic, “ that syllogism is naturally prior in order to induction¹⁵,” is equally unfounded ; for induction does not only naturally but necessarily precede syllogism, and is in every respect indispensable to its existence ; since till generals are established, there can neither be definition, proposition, middle term, or axiom, and consequently no syllogism.

¹³ Let the truth in question be whether A contain C, and the general truth that A contains B. B the subject of the general proposition is the middle term, by which a middle proposition is formed, that C contains B, from which the truth in question is deduced. Aristot. Prior. Analyt. on the invention of middle terms.

¹⁴ Itaque alia res est inventio mediï, alia judicium de consequentia argumenti. De Augm. Scient. lib. v. cap. 4.

¹⁵ Φύσει μὲν ἔν πρότερος καὶ γνωριμώτερος, διὰ τῶ μέσῃ συλλογισμός· ἡμῶν δὲ ἐναργέστερος, ὁ διὰ τῆς ἐπαγωγῆς.—Analyt. Prior. cap. 23.

And as induction is the first, so is it the more essential and fundamental instrument of reasoning; for as syllogism can never produce its own principles¹⁶, it must have them from induction; and if the general propositions or secondary principles be imperfectly or infirmly established, and still more if they be taken at hazard, upon authority, or by arbitrary assumption, like those of Aristotle, all the syllogizing in the world is a vain and useless logomachy¹⁷, instrumental only to the multiplication of false learning, and to the invention and confirmation of error. The truth of syllogism depends ulti-

¹⁶ Syllogismus ad principia scientiarum non adhibetur. Nov. Org. lib. i. aph. 21.

¹⁷ Syllogismus ex propositionibus constat, propositiones ex verbis, verba notionum tesseræ sunt. Itaque si notiones ipsæ (id quod basis rei est) confusæ sint et temere a rebus abstractæ, nihil in iis quæ superstruuntur est firmitudinis: itaque spes est una in inductione vera. Nov. Org. lib. i. Aph. 14. Ἄδύνατον δὲ τὰ καθόλου θεωρῆσαι, εἰ μὴ δι' ἐπαγωγῆς· (ἐπεὶ καὶ τὰ ἐξ ἀφαιρέσεως λεγόμενα ἔσαι δι' ἐπαγωγῆς γνώριμα, κἄν τις βέληται γνώριμα ποιεῖν ὅτι ὑπάρχει ἐκάτω γένει ἔνια)—οὔτε γὰρ ἐκ τῶν καθόλου ἀνευ ἐπαγωγῆς, ἕτε διὰ τῆς ἐπαγωγῆς ἀνευ τῆς αἰσθήσεως.—Analyt. Post. lib. i. But the ἐπαγωγή of Aristotle is a very vague and imperfect representation of sound and legitimate induction, which he never studied or cultivated with the pains and analytical acumen he bestowed on the syllogism.

mately on the truth of axioms, and the truth of axioms on the soundness of inductions.—Thus induction is not only different from, but prior and essential to syllogism, and likewise superior in value¹⁸.

But though induction be more useful in the first invention of truth, syllogism it is said is more useful in teaching it when found.

Truth is more easily conveyed than found. Induction is not only the sole method of invention, but of initiation also, taken in its enlarged and classical meaning, for all parts of human learning, except the mathematics, owe to it both their origin and advancement. Being however more difficult and laborious, and less ostentatious than the other, it has been too much neglected, and almost quite abandoned, to the great loss of truth in general. Syllogism affects indeed

¹⁸ “In matters to which the theory of syllogism extends, a man of good sense, who can distinguish things that differ, can avoid the snares of ambiguous words, and is moderately practised in such matters, sees at once all that can be inferred from the premises; or finds that there is but a very short step to the conclusion.” Dr. Reid, in Appendix to vol. iii. of Lord Kaims’s Sketches.

to be the method of science, and the method of instruction ; though perhaps when duly estimated, with less title to those distinctions than the former. It is indeed the method of mathematics, which have unfortunately been mistaken by logicians for the rule of universal reasoning¹⁹ : and, as the word signifies teaching, or that by which men are taught, from another mistake of its meaning²⁰, they thought syllogism was, of course, the method both of science and instruction. In all other parts of science however, whether we wish to add to their truths by farther inventions, or, really to exemplify, illustrate, or teach what is already known, the only method of science, and the best method of instruction is that of invention and initiation by induction²¹.

¹⁹ Duncan, p. 118, and almost every other book of logic. Mr. Harris somewhere calls it the praxis of universal logic : and Mr. Locke was perhaps as much misled by this mistaken notion as any other philosopher.

²⁰ The true and original meaning of *μαθήματα* was, to teach men to ascend from material to immaterial subjects, that is, from physics to metaphysics.

²¹ *Scientia, quæ aliis tanquam tela pertexenda traditur, eadem methodo (si fieri potest) animo alterius est insinu-*

Thus I have taken a general and comprehensive, but compendious view (and they who know how many volumes have been employed upon syllogism alone cannot think that I have been prolix) of the whole exercise of reason, as it advances in the direct investigation of truth, which is ascending and descending; ascending by induction from less to greater, from particulars to generals; and descending by syllogism from greater to less, from general to less general, and to particulars.

anda, quâ primitus inventa. De Augm. Scient. lib. vi. cap. 2.

On the general subject of this chapter, consult Reid's *Analysis of Aristotle's Logic*; Stewart's *Philosophy of the Mind*, vol. ii.; Herschell's *Introduction to Natural Philosophy*; Barrow's *Lectiones Mathematicæ*, Lect. vi.; the article *Logic* in the *Encyclopædia Britannica*; Campbell's *Philosophy of Rhetoric*, vol. i. chap. 5, &c.—*Editor*.

SECT. VII.

*Of Reasoning by Analogy*¹.

TO these two kinds of reasoning which are direct, we add another of great importance and extent which is indirect and collateral.

The principle, in which this branch of logic has its foundation, is a native bent and propensity of the mind, strengthened by experience and confirmed by habit, by which we are involuntarily led to expect that nature and truth are uniform and analogous throughout the universe—that similar causes of whatever kind will, in similar circumstances, at all times produce similar effects: or, if the causes cannot be known, that similar effects² will explain, illustrate, and account for similar effects.

¹ On the general subject of this chapter, consult Butler's *Analogy*; Reid's *Essays*, vol. i. chap. iv.; Stewart's *Elements*, vol. ii. chap. 4, sect. 2, § 3.

² If the liberty of arguing from a similarity of effects be

This principle then resolves itself into similitude, and reason acts upon it, as in all other cases, by comparing and judging. Thus we argue from truths which have been proved by direct reasoning, or which are obvious to simple apprehension, to others which are similar in cause or in effect; and if, upon comparing and judging, the principle will bear us out, we conclude the latter to be also true; a conclusion which will supply us with a kind and degree of truth sufficient for most of the uses and purposes of human life.

This method of reasoning is Analogy, which according to Quintilian, is “to refer a thing that is doubtful, to something similar and different, that uncertainties may derive their proof from certainties³.”

This kind of reasoning has a more permanent and certain foundation than perhaps may appear to some upon a superficial esti-

once denied us, all experimental philosophy will be in a manner useless. Jones's *Philosophy*, p. 119.

³ *Analogiæ hæc vis est, ut id, quod dubium est, ad aliquod simile, de quo non quæritur, referat, ut incerta certis probetur.* Quintilian. *Inst. Orat. lib. i. cap. 6.*

mate of that similitude on which it rests. "This is not," says the excellent Bishop Browne, "an appearing and metaphorical similitude; it is the substituting the idea or conception of one thing to stand for and represent another, on account of a true resemblance and correspondent reality in the very nature of the things compared. It is defined by Aristotle, an equality or parity of reasoning⁴; though, in strictness of speaking, the parity of reasoning is rather built on the similitude and analogy, and consequent to them, than the same with them⁵."

The result of this reasoning is however not properly conviction; it is only strong presumption at best; and, from the view of the truths we know, arises an opinion concerning those we do not know, which opinion will of course vary in the degrees of its force almost from the point of absolute certainty through the whole scale of probabilities, down to the confines of doubt and conjecture—according to the nature of the

⁴ Ἡ ἀναλογία ἰσότης ἐστὶ λόγῳ. Ethic. Nicom. lib. v. cap. 3.

⁵ Bp. Browne's Divine Analogy, p. 2.

truths from which we reason—according to their greater or less extent and—according as the cases and instances compared are more or less similar.

Analogy is a species of logic on which the Stagyrice has been as frugal of his philosophy⁶, as he was upon induction. It is however a method of reasoning of most useful and important application and almost of universal extent in life.

It is the business of the first logic to convey truth and information to the mind, easy in its application and obvious in its conclusion. And besides this advantage, resulting from its plainness and familiarity (an advantage which the ablest philosophers and the divinest teachers have been careful to improve), it has other privileges. Many truths, divine and human, of the last importance to men are incapable both of direct proof and direct

⁶ The παράδειγμα, of which he speaks in the twenty-fifth chapter of the second book of the Prior Analytics in a very cursory way, is indeed something like *analogy*, τέτθ δὲ πίσις ἐκ τῶν ὁμοίων—φανερὸν ἔν ὅτι τὸ παράδειγμά ἐστιν, ἔτε ὡς ὄλον πρὸς μέρος, ἔτε ὡς μέρος πρὸς ὄλον, ἀλλ' ὡς μέρος πρὸς μέρος, ὅταν ἄμφω μὲν ἦ ὑπὸ τὸ αὐτὸ, γνωριμον δὲ ζάτερον.

communication⁸, and can only be evinced and conveyed to the understanding, by this indirect and collateral channel. Many which can be directly proved and directly conveyed, it illustrates with clearer and fuller light, and sets them in a point of view easier to be seen and apprehended by us.

But analogy has also a scientific use which is conspicuously displayed, when it acts as a necessary supplement and auxiliary to inductive reasoning, without which, this useful part of logic would remain very defective and confined. When the philosopher has founded a general truth or proposition upon a certain number of particular comparisons, it is by the help of analogy that he gives it an extent over all similar instances throughout the universe, till it may happen to be contradicted by one, in which it is found to fail. So that by analogy the whole province of truth is facilitated, illustrated and enlarged, and widened beyond the strict and proper limits both of inductive and syllogistic reasoning.

⁸ Bishop Browne's Divine Analogy.

Thus we see this method of reasoning is totally different from those preceding. Whilst they alike agree in two general points—that they argue from truths known before⁹ either particular or general, and—that they reason by comparing and judging; yet is it from different first truths or principles, and in a different way. And whilst the student or philosopher is deriving advantage from each, let him take care to keep them separate and distinct, and in their proper sphere; or, by a promiscuous application, he will be in danger of employing them where they will not usefully apply, and instead of leading him to truth, where they will betray him into error.

These three different methods constitute the proper, and, I think, the whole, business of logic, that useful and universal art, which for two thousand years has been twisted and

⁹ Ἐκ τῶν προγινοσκομένων πᾶσα διδασκαλία. Aristot. Ethic. Nicom. lib. vi. cap. 3. Ex præcognitis et præconcessis.

Πᾶσα διδασκαλία καὶ πᾶσα μάθησις διανοητικὴ ἐκ προὔπαρχέσεως γινέται γνώσεως. Ibid. Analyt. Post. lib. i. cap. 1.

tormented into ten thousand shapes; which has been proudly and formally professed by many, but philosophically practised or understood by few.

This logic is legitimate in its origin and rational in its progress. It rejects the old logic as illegitimate, or the foundling of imagination, rather than the offspring of reason. Considering all truth as the furniture of the mind and modified by its faculties, it takes account of these faculties from the first philosophy, with which universal science it has a near connexion¹⁰, distinguishing their separate objects and operations. It then applies reason to the evidences or first principles of every kind, advancing by a slow and gradual motion to general truths or secondary principles, which form the basis of farther conclusions to be deduced in another but easier way. And it evinces and illustrates the whole, by correspondent and

¹⁰ Ἡ δὲ διαλεκτικὴ τὴν πρῶτην μιμημένην φιλοσοφίαν τὰ πάντα πειρᾶται δεικνύσαι, ὥσπερ πάντων αὐτῆ ὑποκειμένων.—Philoponus.

collateral proofs. Thus it fixes a just criterion for determining its assent in all.

It does not begin with definitions of its own invention hypothetically formed and verbally constructed, calculated only to answer its own views, and to serve its own intentions. It does not erect its own imaginary notions and premature assumptions into dogmas and principles which are gratuitous, and which it forbids to be examined. Instead of pursuing the quibbles and niceties of terms divorced from things and arbitrarily defined, it descends to the minutiae and subtlety of things themselves experimentally examined; making it the chief object to canvass and to establish the real principles of knowledge. From these principles, it does not spin the cobwebs of imaginary systems without use or end¹¹, but erects upon them

¹¹ Hoc genus doctrinæ minus sanæ et se ipsam corruptentis invaluit, præcipue apud multos ex scholasticis, qui summo otio abundantes, atque ingenio acres, lectione autem impares (quippe quorum mentes conclusæ essent in paucorum authorum, præcipue Aristotelis dictatoris sui scriptis, non minus quam corpora ipsorum in cœnobiorum cellis) historiam vero et naturæ et temporis maxima ex parte ignorantes; ex non magno materiæ stamine, sed maxima

the superstructure of useful and substantial science.

Instead of relying on mere memory for information, it prompts the mind to the exercise of reflection. Instead of building on the vague authority of others, where it can it judges for itself. Thus prejudices begin to soften and prepossessions to vanish, and that weak opinion, which governs the multitude, to lose its influence.

It is not presumptive but inquisitive, not indolent but active, not verbose but practical. It does not waste our time in wrangling and disputation, which, however they may have been magnified in their use when viewed through the medium of that ignorance of which they are the patrons, or extolled by the tongue of foolish adulation, had never any other purpose, than to retard the progress

spiritus, quasi radii, agitatione, operosissimas illas telas, quæ in libris eorum extant, confecerunt. Etenim, mens humana si agat in materiam, naturam rerum et opera Dei contemplando, pro modo materiæ operatur, atque ab eadem determinatur; sin ipsa in se vertatur (tanquam aranea texens telam) tum demum interminata est, et parit certe telas quasdam doctrinæ, tenuitate fili operisque admirabiles, sed quoad usum frivolas et inanes. De Augm. Scient. lib. i. p. 40.

of good learning, and to check the growth of truth¹², and, in the pointed language of the apostle, “to minister questions and to gender strifes.” What it fairly acquires of whatever kind, it enjoys with gratitude, and communicates with simplicity. It discriminates between certainty and probability, knowledge and conjecture, and their several modes. It endeavours to ascertain the just limits and extent of the human understanding, and has the courage to be ignorant of what lies beyond its reach.

Professing to fill the great and general office of conducting men in the invention and communication of all it is possible they can know, it disdains the narrow limits of human system, and refuses to be considered as an art, which by that system is made complete and perfect. Though subject to the rules which are prescribed by the nature of the truth which is its object, it disdains to be confined within the trammels of mode and figure, and to be cramped in its motion by

¹² *Logica quæ in usu est ad errores stabiliendos et figendos valet, potius quam ad inquisitionem veritatis; ut magis sit damnosa quam utilis.* Nov. Org. lib. ii. aph. 12.

the artificial forms of Aristotle, Smiglecius, Burgersdicius and Wallis. It is always in a state of free investigation and progressive improvement, changing with the changes, and advancing with the advancement of learning, till all truth be discovered.

SECT. VIII.

Of the respective Kinds of Truth.

FROM the view that has been taken of truth in general, and the relation which it bears to the intellect, the will, and the imagination, the three great provinces of the human mind, and of its general principles, primary and secondary, from which all reasoning divides into two direct methods, the inductive and the syllogistic, assisted by a third, which is the analogic, let us descend to the consideration of particular principles, their correspondent method of reasoning, and the kinds of truth in which they terminate.

Truth, which we have been hitherto considering in the gross, like every thing in

the universe, will be found upon a nearer inspection to vary its features, to assume a particular complexion, and to take a special form, according to the different nature of its means, which are all those various substances and subjects of the universe, both of mind and body, from which its particular principles and grounds of judgment are supplied¹.

And as we have observed the general method of reasoning, to differ with the general division of principles; so we may reasonably expect to find that all these particular principles, as they shoot from the common stock into all the arts and sciences, and give life to every branch of the tree of knowledge, demand a different sort of proof or evidence, and a method of reasoning appropriate to themselves².

¹ Αἱ ἀρχαὶ καὶ τὰ αἷτια ζητεῖται τῶν ὄντων· δῆλον δὲ ὅτι ἢ ὄντα. Ἔστι γάρ τι αἷτιον ὑγιείας καὶ εὐεξίας. Καὶ τῶν μαθηματικῶν εἰσιν ἀρχαὶ καὶ στοιχεῖα, καὶ αἷτια. Καὶ ὅλως δὲ πᾶσα ἐπισήμη διανοητικῆ, ἢ καὶ μιτέχυσά τι διανοίας, περὶ αἷτίας καὶ ἀρχάς ἐσιν, ἢ ἀκριβεσέρας, ἢ ἀπλυσέρας· ἀλλὰ πᾶσαι αὐται περὶ ἕν τι, καὶ γένος τι περιγραψάμεναι, περὶ τῶν πραγαματεύονται. —Aristot. Metaph. lib. vi. cap. 1.

² Αἱ μὲν αἰσθήσει ποιήσασαι αὐτὸ δῆλον, αἱ δ' ὑπόθεσιν λαβῆσαι τὸ τί ἐσιν, ἔτω τὰ καθ' αὐτὰ ὑπαρχόντα τῶν γένει περὶ ὃ εἰσιν, ἀποδεικνύουσιν ἢ ἀναγκαιότερον ἢ μαλακώτερον. —Aristot. Metaph. lib. vi. cap. 1.

But what is of still higher importance, we shall find that all these different principles, so differently conducted, terminate in different kinds of truth, and also possessed of various degrees of evidence and conviction. Thus we see the fruits of the harvest or of the vintage differing from each other both in shape and quality, according to the different seeds from which they spring, and to the different mode of their cultivation.

And here we may contemplate with admiration and not without advantage, that amazing similitude, that universal harmony, and exact proportion, which, in the midst of the most wonderful variety, pervade the mental and material systems; by which a clear and resplendent ray of light is reflected from the one part upon the other, however remote and distinct, and even independent of each other they may appear.

“And God said, Let there be light and there was light³.”—“And God said, Let the earth bring forth grass, the herb yielding

³ Gen. i. 3.

seed, and the fruit-tree yielding fruit, whose seed is in itself, after its kind upon the earth; and it was so⁴." In all his works, however diversified, he is uniform in operation and consistent with himself; and this mandate of the Deity giving law to the various kinds or productions of his vegetable kingdom may be considered from the analogy of things as extending to those of his intellectual. We may thus consider the several kinds of truth with which the world is replenished, as springing from seeds or principles of their own, which they possess within themselves, ripening when matured by proper cultivation into every species of knowledge human and divine, producing that measure of certainty or probability of which they are naturally capable, and terminating in those several degrees of conviction and assent which are shaped and proportioned to themselves.

This mode of illustrating mental operations and affections by the analogy of vegetable productions, was employed by One,

⁴ Gen. i. 11.

whose method, as it was on all occasions the aptest and most familiar, may be imitated with advantage, and whose example, as it was in all things the model of perfection, may be followed without reserve.—“Ye shall know them by their fruits. Do men gather grapes of thorns or figs of thistles? Even so every good tree bringeth forth good fruit, but a corrupt tree bringeth forth evil fruit⁵.”—This mode of reasoning is at once simple and energetic; and by reversing the analogy we may say, that as to expect a produce of wheat from the seed and cultivation of barley, or the fruit of the olive tree from the plant and culture of the vine, would in common life be marked as an absurdity akin to madness; so to suppose that truths from different principles and deduced in a different way will result the same, will shine with an equal degree of brightness, or be attended with the same measure of conviction, involves an absurdity equally great, though perhaps not quite so glaring. Yet, whilst the former is an absurdity of which the peasant is utterly incapable, the latter

⁵ Matth. vii. 16, 17.

has too often disgraced the philosopher or theologian and involved them in error and confusion.

From the vast number and variety of substances and subjects both mental and material with which the universe is so abundantly replenished and so beautifully adorned, the particular principles or seeds of truth may be expected to consist of many and various kinds. But to take them up purely and distinctly in their proper existence, that is, as every substance or subject is calculated by nature to make its address to the understanding and to afford it a just and solid ground of judgment; and then to pursue them each in its distinct and proper province in the way which they lead themselves to the end which they are calculated to fulfil and to no other, and in that end to repose with confidence, this is the particular office of pure and genuine logic,—that universal art, to which when fairly and philosophically, not scholastically exercised, science and learning have been and must ever be indebted.

Here then a wide and various field of study

and speculation lies open before the rational and ingenuous inquirer, full of irregularity and order, of variety and consistency, of number and uniformity, for the exercise of his judgment and the trial of his industry. By a process of reasoning philosophically instituted and logically conducted, adapted with address to the nature and genius of different subjects, and varied with their principles, he may hope to conduct his researches in the safe but silent, in the slow but sure investigation of the causes of truth and error. And if after his most diligent and best directed labours, he should fail of success in many parts of this vast and various field, he will have learned the wisdom and possess the fortitude to rest in ignorance, thankful for what he is allowed to know, and without presuming that Providence intended he should know the whole.

Thus though truth with other exclusive perfections be of equal certainty in the Divine mind, (for all truth is equally opposite to falsehood, though the opposition be not equally obvious to us,) that partial, pro-

gressive, various and deceptive though immutable ray of it which illumines the human, when logically and distinctly found, does not shine out upon all subjects with the same force and brightness, but is varied into many kinds and degrees, like the different shades of light and colour, according to the different origin and the different medium through which it comes; the darkest of which shades of truth may even be ordained by his omniscient will to be the "Light of life." Yet Wisdom will instruct her children, of whom in all virtue and knowledge she is justified, to despise and dishonour none; but to cultivate all truth with diligence and humility, with "meekness and fear⁶," and in their researches of every kind to adopt something like the following rule

"To take up the principles of each part of learning as they exist in nature, in its distinct and proper province; to judge and reason in the method which these principles prescribe; and, when the truth is found, whatever it may be, to embrace and honour

⁶ 1 Pet. iii. 15.

it as the gift of Heaven by a reasonable and virtuous assent, and to rest satisfied in it, as the fittest and the best, and as all that Providence in his wisdom intended to give.”

By the use of such expedients and by the application of such a rule as sound logic and philosophy prescribe, with the aid of virtue and religion, we may hope to search into the nature, genius, and dependencies of the different kinds of knowledge ; to trace the several links of the golden chain which the Poet so finely imagined to be let down from the throne of Jupiter ; and to be enabled to perceive how reason ascends step by step, through all the regions of science human and divine, to the universal fountain of light and truth.

THE GENERAL PLAN.

THE rule of reason which I have attempted to establish on the preliminary principles discussed in the preceding sections, is I hope just and philosophical, and subject to no fair ground of objection. To exemplify this general rule by applying it particularly to some of those important parts of knowledge which are cultivated in this celebrated university, or in other words, to reduce the particular parts under the general rule, may be to all who can peruse it a useful, and to some an interesting work.

According to this plan therefore we shall attempt to trace the distinct and proper principles, to point out the right method of reasoning, and to make that just assent, which appertain to the different kinds of truth, all corresponding with each other, as they severally relate to the intellect, the will, and the imagination; and this for the express and

special purpose of ascertaining the proper nature, the particular method, and the peculiar genius of theologic truth. This design, should I be able to execute it according to the hope perhaps the presumption which I have indulged, promises to lay the deepest as well as the broadest base on which “to ground and establish the Christian faith¹.”

This will form the first part of my design and be preparatory to my second object, which is—to show how all the other kinds of truth minister and subserve, in their proper use, both to the introduction and support of theological, and thus contribute to the further confirmation and illustration of that faith.

The second part will pave the way to our third object,—*viz.* to discover, in the different modes of abuse of the several kinds of truth as they pass in review before us, several of the principal and most inveterate causes of heretical and schismatical errors². By laying bare their root and pointing out their origin,

¹ See the Extract from the Will of Mr. Bampton prefixed to this volume.

² See the same extract.

this method will prove the most logical and effectual to eradicate and expose them.

In the first Part which is the ground-plot of the two following, we shall take a logical estimate of the different kinds of knowledge, and chalk out a general chart of their distinct and separate provinces, exhibiting a parallel or comparative view of the different logic appropriated to each—a parallel of their principles—a parallel of their reasoning—and a parallel of their truth.

Such a general chart and estimate, by distinguishing them from each other and by presenting before the eye a full and comprehensive prospect of their order and disposition, their relations and connexions, their bearings and dependencies, may afford many facilities to the advancement of universal learning, may contribute to remove much of the difficulty of science, and assist reason in piloting her way with safety and success through every part of her literary voyage.

From general views of science the student derives strength of mind and clearness of

comprehension. Like the enlightened traveller with a map of the roads and districts in his hand, he can take the whole country before him at one glance. He can mark clearly with his eye every confine, division, and subdivision of the whole, and can see distinctly every object and its situation, within the extent of the horizon. Instead of wandering about in a perpetual maze of error and confusion from narrow and contracted views, as if led by the glimmerings of a torch through the darkness of the night; he moves from place to place with ease and certainty in the enlargement of his mind, as under the direction of the sun at noon. "Were it not better," says the incomparable Bacon, "for a man in a fair room to set up one great light, or branching candlestick of lights, whereby all may be seen at once, than to go up and down with a small watch candle into every corner? For when you carry the light into one corner, you darken all the rest³."

Delivered by such an enlarged and com-

³ De Augm. Scient. lib. i. p. 40.

prehensive view of things from all attachments and aversions which are partial and confined, he is dispossessed of prejudice, which is always an inveterate, and often an invincible enemy of truth; which warps and misleads the judgment, and draws all the powers of the understanding within the confines of its own contracted prison. And beside the yoke of prejudice, he can shake off those embarrassing difficulties which have their origin only in partial views; but which however insignificant, puzzle and confound the reasoner. “The sciences by their combined and confederated force,” according to the observation of the same philosopher, “ought to be the true and brief way of confutation and suppression of all the smaller sort of objections⁴.” He can also rid himself at once of those trifling and minute inquiries, which whilst they waste his labour, contract his genius and perplex his judgment, are frivolous in themselves, and unworthy his attention. Thus by reflection from science to science, intellectual light is redoubled

⁴ De Augm. Scient. lib. i. p. 40.

and concentrated; and as it diffuses itself with impartiality and perspicuity over the whole field of learning, it is like that of the sun breaking through a cloud, which dispels the mists and vapours that surrounded the bewildered traveller, and enables him to overcome all the difficulties and obstructions which beset his journey.

Thus enlarged in his views and cleared of his impediments, and raised by a general elevation above the level of the particular parts of science, the student can descend to the cultivation of each with every fair and advantageous prospect of success. Whilst he withdraws his attention from the general scene to particular objects, he is still mindful of the keeping and consistency of the whole. He sees them in their connexion and dependence upon each other, and without being in danger of mixing and confounding them together, he avails himself of the assistance which they mutually lend and mutually borrow. In their separate cultivation, he consults the nature and genius of each, and actuated by liberal and impartial motives, he pursues each in its own way as it leads him

by a clue of reasoning to truth and happiness, and finally conducts him to their sublimest height, even to their abode near the footstool of the Almighty.

But amidst scenes of knowledge so various and extensive as those which are displayed in the universal theatre of truth, some objects may be clearly and distinctly viewed by the naked eye; whilst others are not to be discovered without the help of instruments skilfully applied; and others from their remoter distance or more refined tenuity vanish entirely out of sight. Whilst many subjects of inquiry burst fully upon the understanding by their native force and evidence; others, though discoverable, are in themselves more obscure and intricate; and others perhaps more numerous than both lie beyond the verge of all mortal cognizance.

To distinguish in this general scene of things what is light and what is darkness—what he can know, and what he cannot know; and then to mark the different force and clearness of the light, and the different shades in which it is dispensed—the modes

and degrees in which he knows, are objects of the last importance to the philosophical inquirer, both for the apprehension of truth and the detection of error.

These important objects will be more easily and effectually secured by the help of such a general chart; which as it estimates and displays the principles of all true learning, will exclude every thing not possessed of such principles, thereby determining what is knowable from what is not, and deciding between what is light and what is darkness. And as it places those parts of truth which are within the verge of human comprehension in juxtaposition with each other, by affording him an easy opportunity of comparing them together in every relation, in their principles, in their reasoning, and their truth, it will enable him from these comparisons to furnish himself with a general scale or common measure, by which to ascertain the particular nature and relative force of every kind of truth and to adjust them with precision.

Thus by the help of this intellectual scale he will be enabled to range truths above each other so far as relates to their convic-

tion, according to their respective evidence, and the assent to which they are respectively entitled, and to mark from its operation in each, the exact proportion and degree of the strength or weakness of human reason.

Though possessed neither of the instrument nor the means of boundless knowledge, he will find that the Author of all truth hath supplied him with what is sufficient of both for the purposes of human life, and for the pleasures of intellectual enjoyment; and the more he knows, the more will he rest satisfied in that sufficiency. By applying his reason, the instrument, fairly and logically to the different subjects, which are the means, that present themselves before him, he will find whether they can supply him with sound principles of judgment, and what those principles are. Thus he will secure the former of these objects by discovering the capacity and extent of reason, and what lies within and without its reach. And by the application of the instrument fairly and logically to the subjects, which are the means, constituting all the different kinds of truth in their respective provinces, and by a compa-

rative estimate between them, he will ensure the latter, by distinguishing the modes and degrees of knowledge.

Thus by submitting to the nature and the constitution of things through the whole of its instrumental employment, the logic he applies will neither lead him away from truth into speculative dreams by fancied objects which in fact have no foundation; nor into the endless maze of error and confusion by sending him in pursuit of truths which are above his comprehension. But what is of still more importance to the great cause of learning, as involving an evil which is more generally incurred, he will not be in danger of misleading his judgment and betraying his assent by the expectation of stronger or different evidence, than the nature of the subjects and the truths resulting from them can afford, that is, by requiring more or less than they are calculated to afford.

A logic so general in its views and appropriate in its method, will on the contrary both abridge his labour and ensure his success. It will abridge his labour by cutting off all that is useless and superfluous,

which vainly attempts to search after truths that have no existence, or which as vainly struggles after those which it can never reach. And it will promise him success by directing his researches right, and confining them within the proper track in which the truth in question can be found, as well as by aiding and conducting him through every stage of the inquiry.

And since both the means which supply the principles, however different from each other, are at all times and to all persons in themselves the same, and also the instrument, viz. reason, however it may differ in degrees of strength with times and persons, is the same essential faculty in all; the end which is truth, however various in kind, if faithfully sought and successfully found, will be unchangeably and individually the same to all.

Where then is error, that many-headed monster which goes on triumphing and to triumph, though not conquering and to conquer (since truth will be victorious at last is the faithful promise of One on whom we can steadfastly rely), and leading thousands captive in her train?—She lies hidden under

the toils of a dark and partial logic, by which the learned have suffered themselves to be enslaved, and which by its various artifice and chicanery, gives to some of the worst of falsehoods the privilege to wear the face of even the best of truths.

In the pursuit of a plan which embraces so many different and distant objects, I shall have occasion to visit the sources of the arts and sciences, and to run the circuit of general learning; but whatever may be my failings in the execution of a design stretched over so wide and various an extent (which I fear will be many), let me in some measure bespeak their pardon, and endeavour to atone for them in the outset, by a promise, to be plain and undisguised in every part. I had much rather betray my own ignorance and want of ability than attempt to impose upon the judgment of others⁵.

⁵ Neque enim aut confutationum triumphis, aut antiquitatis advocacionibus, aut autoritatis usurpatione quadam, aut etiam obscuritatis velo, aliquam his nostris inventis majestatem imponere aut conciliare conamur; qualia reperire non difficile esset ei, qui nomini suo, non animis aliorum lumen affundere conaretur. Non (inquam) ullam aut vim

As far therefore as the plan will allow, I should wish to pursue the initiative method ; not that which begins with definitions and proceeds by dogmas, which obtrudes itself upon the judgment and expects to be believed ; but that which puts the mind upon inquiry and solicits to be examined ; not that which seeks popularity as its dearest object by gratifying the indolent, who form indeed too great a majority ; in which the author has only to select a subject interesting to the superficial and sentimental feelings, and capable of much adventitious ornament, and by a fashionable and sonorous diction, to hide his ignorance and to ensure his fame⁶ ; but that which invites the active and inquisi-

aut insidias hominum judiciis fecimus aut paramus ; verum eos ad res ipsas et rerum fœdera adducimus ; ut ipsi videant, quid habeant, quid arguant, quid addant, atque in commune conferant. Nos autem si qua in re vel male credidimus, vel obdormivimus et minus attendimus, vel defecimus in via et inquisitionem abruptimus ; nihilominus iis modis res nudas et apertas exhibemus, ut errores nostri, antequam scientiæ massam altius inficiant, notari et separari possint ; atque etiam ut facilis et expedita sit laborum nostrorum continuatio. Bacon. De Augm. Scient. Præf.

⁶ Haud facile quis verbis assequatur, quantam calamitatem attulerit hoc ipsum quod dicimus : quod homines, ingenita superbia et gloria vana, eas materias tractationum,

tive in the spirit of philosophy to go along with it, in which he lays himself fairly and freely open, solely and honestly devoted to the interests of truth⁷.

“One of these methods,” says Lord Bacon, “delivers popular subjects as to the illiterate; the other, sciences as to the sons of science:” and the latter is that which alone can be worthy of the author, or of his audience. Popularity is an idol to which the ambitious may bend the knee. Truth is that divinity which a philosopher need not blush to worship.

eosque modos tractandi sibi delegerint, quæ ingenia ipsorum potius, commendent, quam lectorum utilitatibus inserviant. Optime Seneca, “Nocet illis eloquentia, quibus non rerum facit cupiditatem sed sui:” siquidem scripta talia esse debent, ut amores documentorum ipsorum, non doctorum excitent. Ii igitur recta incedunt via, qui de consiliis suis id prædicare possint, quod fecit Demosthenes, atque hac clausula ea concludere, “Quæ si feceritis, non oratorem duntaxat in præsentia laudabitis, sed vosmet ipsos etiam, non ita multo post, statu rerum vestrarum meliore.” Ego certe, ut de me ipso, quod res est, loquar, et in iis quæ nunc edo, et in iis quæ in posterum meditor, dignitatem ingenii et nominis mei (si qua sit) sæpius sciens et volens projicio, dum commodis humanis inserviam. Bacon. De Augm. Scient. lib. vii. cap. i.

⁷ When we set out in pursuit of truth as of a stranger, and not in search of arguments to support our acquaintance with preconceived opinions; when we possess ourselves in a

And if in pursuing an argument, which from its vast and universal moment has been often treated, we should go wide of the common road, (not from a love of novelty which I disclaim, but from that love of truth and utility which, in all temperance and humility, I avow), as I solicit examination and am under just correction, let me confess I had rather commit errors in a new way, though more dangerous and difficult to be found, than walk more safely and indolently over ground which has been beaten a

perfect indifference for every thing but known and well-attested truth; regardless of the place from whence it comes, or of that to which it seems to be going; when the mind, I say, is in this state, no one, I think, can fairly suspect the reality of its attachment. Warb. Div. Leg. book iv. p. 12.

Nos æterno veritatis amore devicti, viarum incertis et arduis et solitudinibus nos commisimus; et divino auxilio freti et innixi, mentem nostram, et contra opinionum violentias et quasi instructas acies, et contra proprias et internas hæsitaciones et scrupulos, et contra rerum caligines et nubes, et undequaque volantes phantasias, sustinuumus; ut tandem magis fida et segura indicia viventibus et posteris comparare possemus. De Augm. Scient. Præf. p. 10.

Postremo omnes in universum monitos volumus, ut scientiæ veros fines cogitent; nec eam aut animi causa petant, aut ad contentionem, aut ut alios despiciant, aut ad commodum, aut ad famam, aut ad potentiam, aut hujusmodi inferiora, sed ad meritum et usus vitæ, eamque in charitate perficiant et regant. De Augm. Scient. Præf. p. 11.

thousand times. It is only by trying many and different roads to knowledge, that men can hope to discover the right path to her temple.

Sensible how great, how various, how extensive is the work we undertake; fearful of degrading by mixtures of human weakness that ineffable Wisdom, which in part we are attempting to display, and deeply conscious of my own defects,—I feel the task I have proposed too heavy for my unassisted abilities.—“O send her out of thy holy heavens and from the throne of thy glory, that being present she may labour with me, for she knoweth and understandeth all things; and she shall lead me soberly in my doings and preserve me in her power⁸!”

⁸ Wisdom, ix. 10, 11.

CHAP. I.

MATHEMATICS.

SECT. I.

Of the Logic of Mathematics.

EVERY thing which is the subject of human knowledge belongs either to mind or body.

The two parts of learning metaphysic and logic which have been touched in a summary way in the preceding pages, treat more immediately of mind, its powers and operations, its acts and energies. The former, producing by speculation the general principles of all other parts of knowledge, or at least affecting to produce them, is the universal science. The latter, descending more practically to the particular investigation and establishment of the principles of

each as they exist in nature and affect the mind, and then pursuing them in a just and rational way into all their different effects, is the universal art. In universality this as well as in many other respects they have a close connection and affinity with each other¹. All the other sciences and arts, as has been before observed, apply to particular subjects² which are of different kinds and various extent.

Physics form the science which treats more immediately of body or matter organized, its properties and affections, its motions and operations, its qualities and internal structure.

Between these sciences of mind and body, lies one which is intermediate and which partakes of both, taking its subject from the sensible qualities of body, but having it perfectly separated therefrom and made abstract

¹ Aristot. *Metaph.* lib. iv. cap. 2.

Μόνη δὲ ἡ πρώτη φιλοσοφία καὶ ἡ διαλεκτικὴ ὑποκειμένον ἔχει πάντα τὰ ὄντα.—Philoponus in *I Post. Analyt.*

² *Ἐκάστη μὲν ἐπιστημὴ περὶ ἕν τι γένος καταγίνεται.*—Philoponus in *I Post. Analyt.*

by an act of mind³. This intermediate science is mathematics, which as it is related to both, becomes the connecting link by which they are united in the grand system of knowledge. The transition from metaphysics and general logic, to the particular logic of physics and the other parts of learning, will be made aptly and advantageously through the mathematics.

³ Aristotle distinguishes the three sciences thus, *ἡ μὲν γὰρ φυσικὴ περὶ ἀχώριστα μὲν, ἀλλ' ἐκ ἀκίνητα· τῆς δὲ μαθηματικῆς ἕνια περὶ ἀκίνητα μὲν, ἢ χωριστὰ δὲ ἴσως, ἀλλ' ὡς ἐν ὕλῃ· ἡ δὲ πρώτη καὶ περὶ χωριστὰ καὶ ἀκίνητα*.—Aristot. *Metaph. lib. vi. cap. i.* Which is thus explained by Du Val—*Physica quidem versatur circa substantiam mobilem et materialem: Mathematicæ puræ agunt de rebus reipsa mobilibus, et a materia sensibili re inseparabilibus, sed tamen ea ratione qua sunt immobiles, et cogitatione separatæ; vel, quod idem est, prout in sui consideratione, materiam sensibilem non includunt. Ut ergo physica, mobilium et inseparabilium; mathematica vero, velut immobilium et separabilium; sic metaphysica est revera immobilium, æternorum, separabilium, et divinorum contemplatrix. Doct. Peripat. Synop. p. 22.* And again Aristotle distinguishes mathematics both from physics and metaphysical forms, *ἔτι δὲ παρὰ τὰ αἰσθητὰ καὶ τὰ εἶδη, τὰ μαθηματικὰ τῶν πραγμάτων εἶναι φασὶ μεταξὺ, διαφέροντα τῶν μὲν αἰσθητῶν, τῶν αἰδέων καὶ ἀκίνητων εἶναι τῶν δ' εἰδῶν, τῶν τὰ μὲν πόλλ' ἄττα ὅμοια εἶναι, τὸ δὲ εἶδος αὐτὸ, ἐν ἕκαστον μόνον*.—*Metaph. lib. i. cap. vi,* which is thus explained by another commentator.—*Indicat Aristoteles Platonem aliud adhuc genus rerum posuisse [principalium] a rebus sensibilibus et ab ipsis ideis diversum. Nam, præter sensibilia et suas formas, res mathematicas constituit, quas*

This science is confined to the predicament of quantity, which being of two kinds magnitude and multitude, that is, quantity continuous and quantity discrete, the first bounded and defined by figure, the second bounded and defined by number, is accordingly divided by these different subjects into two collateral correspondent branches

geometry and arithmetic⁴. And as they are the simplest in their principles, the clearest in their reasoning, and the most convincing in their truth, the logic of both will be properly introductory to that of the other parts of learning, which are more complicated in their nature, and more involved in their construction.

medias esse dixit inter res sensibiles et inter ideas; et differunt a sensibilibus, quod sempiterna sunt et immobilia entia mathematicæ, sicut ideæ quoque sunt; a formis autem et ideis distant, quod pleraque mathematicæ similia sunt inter se, hoc est, quod plura sint ejusdem speciei individua, ut plures trianguli æquum laterum, plura quadrata, et sic deinceps. Forma autem ipsa et idea unaquæque unum quoddam sit tantum. Ita ut res mathematicæ sint inter res sensibiles et inter ideas, quia de utrisque aliquid commune habent, et tamen ab utrisque rursus differunt. Joan. Ludoy. Havenruterius Comment. in locum.

⁴ Aristot. Categ. cap. vi.

SECT. II.

Of Mathematical Principles.

EXTERNAL nature is the archetype and original of all our sensations and of many of our ideas ; and the evidence of the external senses, exercised upon the superficial properties of innumerable bodies with which they are familiarly and perpetually conversant, viz. their length, breadth, and depth¹, and other exterior qualities ; and again, as familiarly and incessantly employed upon many different objects, which they cannot avoid distinguishing as individuals or monads, is undoubtedly the primary principle of mathematical learning in both its branches.

This is every where the doctrine of Aris-

¹ Καὶ γὰρ ἐπίπεδα καὶ τερεὰ ἔχει τὰ φυσικὰ σώματα, καὶ μήκη, καὶ τεγμᾶς, περὶ ὧν σκοπεῖ ὁ μαθηματικός.—ἀλλ' οὐχ ἢ φυσικῶ σώματος πέρας ἕκαστον· οὐδὲ τὰ συμβεβηκότα θεωρεῖ ἢ τοιούτοις ἔσι συμβέβηκε· Διὸ καὶ χωρίζει· χωριστὰ γὰρ τῇ νοήσει, κινήσεώς ἐστὶ καὶ ἑδὲν διαφέρει, ἑδὲ γίνεται ψεῦδος χωριζόντων.—Aristot. Nat. Ausc. lib. ii. cap. 2.

totle², who as well as Plato has very philosophically remarked, that whereas many of the properties of body are confined to particular senses, those few which are the subject of mathematics are common to all the senses³.

These external and obvious properties of natural body constitute the qualities of what is called mathematical body, if we may be allowed to give the name of body to that which is ideal; for all the other qualities and attributes of natural body being abstracted and taken away by an act of the mind, they are conceived to be left alone, and to exist separate and independent of the bodies from which they are originally taken, constituting what are properly and logically termed ideas. These separate and abstract ideas are units or monads, points, lines, angles, circles, superficies, solids, equality and inequality⁴, and some others, which are

² Metaph. lib. xi. cap. 1—3.

³ Κοινὰ δὲ, κίνησις, ἡρεμία, ἀριθμὸς, σχῆμα, μέγεθος. τὰ γὰρ τοιαῦτα ἕδεμιᾶς ἐστὶν ἴδια, ἀλλὰ κοινὰ πάσαις.—Aristot. De Anima, lib. ii. cap. 6.

⁴ Τὸ μὲν γὰρ περιττὸν ἔσται καὶ τὸ ἄρτιον, καὶ τὸ εὐθύ καὶ τὸ καμπύλον, ἔτι δὲ καὶ ἀριθμὸς, καὶ γραμμὴ, καὶ σχῆμα ἄνευ κινήσεως.—Aristot. Nat. Ausc. lib. ii. cap. 2.

likewise denominated universal forms. The abstraction, by which they are collected from the senses exercised upon many individual objects, is performed in a way so perfectly obvious and familiar, and with so much ease and perspicuity, that they seem to present themselves to the mind immediately⁵, and without the application of inductive reasoning⁶.

Thus mathematical science may be considered as beginning its career with general ideas or abstracted forms⁷. This is a sin-

⁵ Λανθάνουσι δὲ τῷ ποιοῦντες, καὶ οἱ τὰς ἰδέας λέγοντες. Τὰ γὰρ φυσικὰ χωρίζουσιν ἦπτον ὄντα χωριστὰ τῶν μαθηματικῶν.—Aristot. Nat. Ausc. lib. ii. cap. 2.

⁶ Ἐνταῦθα γὰρ τὸ μὲν ὅτι, τῶν αἰσθητικῶν εἰδέναι· τὸ δὲ διότι, τῶν μαθηματικῶν ἔτοι γὰρ ἔχουσι τῶν αἰτίων τὰς ἀποδείξεις, καὶ πολλάκις ἕκ ἴσασι τὸ ὅτι· καθάπερ οἱ τὸ καθόλου θεωροῦντες, πολλάκις ἔνια τῶν καθ' ἕκαστον ἕκ ἴσασι δι' ἀνεπισκεψίαν. Ἐστὶ δὲ ταῦτα, ὅσα, ἕτερόν τι ὄντα τὴν ἑστίαν, κέχρηται τοῖς εἶδεσι. Τὰ γὰρ μαθήματα, περὶ εἶδη ἐστίν· ἢ γὰρ καθ' ὑποκειμένους τινός. εἰ γὰρ καὶ καθ' ὑποκειμένους τινός, τὰ γεωμετρικά ἐστίν· ἀλλ' ἔχῃ ἢ γεωμετρικά, καθ' ὑποκειμένους.—Aristot. Analyt. Post. lib. i. cap. 13. See Barrow's *Lectiones Mathematicæ*.

⁷ Linearum rectarum et circulorum descriptiones, in quibus geometria fundatur, ad mechanicam pertinet. Has lineas describere geometria non docet. Postulat enim ut tiro easdem accurate describere prius didicerit quam limen attingat geometriæ; dein quomodo per has operationes problemata solvuntur, docet; rectas et circulos describere problemata sunt, sed non geometrica, ex mechanica postu-

gular essential privilege, and in their further consideration, we shall find this branch of learning is possessed of many other eminent and exclusive advantages.

One advantage is, that these general or rather universal ideas are immediately capable of being ascertained with a logical precision, and conveyed by clear and adequate definitions in a language which is the most direct and obvious, and which cannot be misunderstood. Geometry defines a point, line, angle, triangle, circle, and any other mode of continuous quantity, the less general by the more general, in terms which are appropriate, and possessed of all possible accuracy and precision ; so that, if the terms be once understood, the ideas they represent cannot possibly be misconceived. Hence a mathematical definition will not only carry with it the utmost light and conviction, but will produce exactly the same effect in one mind as in another, without the smallest shade of variation. And whatever number of units

latur horum solutio, in geometria docetur solutionum usus: at gloriatur geometria quod tam paucis principiis aliunde petitis tam multa præstat.—Newtoni Præf. in Princip.

or monads constitute any idea of quantity discrete, (and these ideas are innumerable) by the admirable dexterity and address of the arithmetician in the arrangement of numbers into stated classes and collections, general and less general, formed out of each other and distinguished by appropriate names, as they rise into higher and more complex orders, tens, hundreds, thousands, &c. (an invention entitled to the gratitude of all ages and countries), its language remains definitive, and its ideas however complex and collective when thus expressed, remain incapable of misapprehension. Thus if of thousands we take one, of hundreds seven, of tens eight, and of units nine, we have at once an adequate definition of the idea, or collective number of the years of the Christian æra, 1789.

Another advantage similar to this and by which it is heightened and completed, is that its ideas thus adequately and easily defined are capable of being exhibited and presented to the eye in an obvious external shape. The diagram of a square, circle, or other figure, though it cannot be a complete

representation of the idea, is sufficient to convey the definition through the sight directly into the understanding; and the signs of number which we call figures, with the order in which they are set down 1789, form a clear and exact representation which puts the mind in immediate possession of the full force of the definition—an invention which we owe to our more modern intercourse with the east, and which the ancient mathematicians, though they had formed some useful arrangements of numbers, did not enjoy, and which though little regarded is one of the first and most important, either in the improvement of the useful and commercial arts, or in the annals of science. This artifice or mechanism of expression addressed to the sight, which forms the readiest and most familiar interpreter to the mind, or even to the touch (for the great Sanderson is said to have been born blind), gives a superior ease and perspicuity to mathematics through all the stages and progressions of that luminous science.

Thus the mathematics possess an extraordinary advantage in the clearness and precision

both of their ideas and in their language, and also in the facility they derive from being capable of being brought before the sight, the readiest and most perfect of our senses.

Into whatever extent or variety these ideas may run, whether through all the forms and constructions of figure, or through all the classes and combinations of number, and however complex and multiform they become, they are only different modifications of one and the same kind, or as Mr. Locke chooses to express it of the same idea, without the mixture or addition of any other; on which account he has distinguished them by the name of simple modes, a distinction which however expressed is very philosophically made. They are formed by adding unit to unit and line to line through all the modifications of number and figure, without the mixture of any thing else: from which circumstance the science in question derives this great and exclusive privilege, that its ideas are totally separate and distinct from those of every other kind.

And however numerous and various they may be, it is another advantage to the pre-

cision of the science to which they belong that every one is absolute and unchangeable in itself, that is, it cannot be either greater or less¹², or any way different from what it exactly is, by partaking or communicating with any other even of the same kind. Two numbers differing only by one unit, or two angles by one degree, are as absolutely different from each other as those which are the most distant¹³. So that mathematical ideas are individually distinct from one another, as well as totally from those of other kinds, and are incapable of having any contraries, which is another very great advantage.

They have therefore only to do with themselves, at the same time that they stand perfectly independent of each other; and it is a further advantage by which they contribute

¹² *Quantitas non recipit majus aut minus.*—Aristot. Ἐπι τῷ πῶς οὐδέν ἐστιν ἐναντίον.—Οὐ δοκεῖ δὲ τὸ πῶσον—ἐπι δεδέχθαι τὸ μᾶλλον καὶ τὸ ἥττον.—*Categ.* c. vii.

¹³ Two is as different and distinct from one, as from a thousand; but ideas of good and evil, hot and cold, hard and soft, and of the different colours, participate with each other, and are more or less akin, varying into shades compounded of their proximates, and having their difference according to their distance.

to the illumination of this science, that all the differences between themselves are most minutely and distinctly marked and ascertained. It is the exclusive privilege of both the kinds of quantity to supply a certain measure or standard, not only to themselves, but to every other subject in the universe capable of mensuration¹⁴. Extension or continuous quantity is measured by any fixed part or division of itself, as by an inch, a foot, and other stated lengths formed out of each other; and number, which is discrete, is measured by stated portions or classes of number, as by tens, hundreds, and so on, as they rise in due order above each other. So that any part, form, collection, or relation of such ideas can be easily compared with others, and pronounced to be exactly equal or unequal, greater or less, or in a certain ratio: whereas the subject of other parts of knowledge, which are the qualities of body, as hot and cold, hard and

¹⁴ Fundatur geometria in praxi mechanica, et est nihil aliud quam mechanicæ universalis pars illa, quæ artem mensurandi accurate proponit ac demonstrat.—Præf. Newtoni in Princip.

soft, or the affections of mind, good and evil, with innumerable others, have no certain measure or criterion to determine the judgment; and, after the best and most exact comparisons that can be made, one quality can only be pronounced to be more or less than another, like or unlike, in different degrees, by a more vague and uncertain determination¹⁵.

From such adequate definitions of these general ideas thus artfully and mechanically expressed, so different and distinct from all

¹⁵ Ἴδιον δὲ μάλιστα τῆ πόσου, τὸ ἴσον τε καὶ ἄνισον λέγεσθαι ἕκασον γὰρ τῶν εἰρημένων πόσων, ἴσον τε καὶ ἄνισον λέγεται. Οἶον σῶμα, ἴσον τε καὶ ἄνισον λέγεται, καὶ ἀριθμὸς, καὶ χρόνος, ἴσος καὶ ἄνισος λέγεται. Ὡσαύτως δὲ καὶ ἐπὶ τῶν ἄλλων τῶν ῥηθέντων, ἕκασον ἴσον τε καὶ ἄνισον λέγεται. Τῶν δὲ λοιπῶν, ὅσα μὴ ἐστὶ πόσα, ἢ πάνυ ἂν δόξαιεν ἴσον τε καὶ ἄνισον λέγεσθαι, οἶον, ἢ διάθεσις, ἴση τε καὶ ἄνισος ἢ πάνυ λέγεται, ἀλλὰ μᾶλλον ὁμοία καὶ ἀνομοία, καὶ τὸ λευκὸν, ἴσον τε καὶ ἄνισον ἢ πάνυ, ἀλλὰ μᾶλλον ὅμοιον. Ὡσε τῆ πόσου μάλιστα ἂν εἴη ἴδιον, τὸ ἴσον τε καὶ ἄνισον λέγεσθαι.—Aristot. Categ. cap. vi. Edit. Morel. Par. 1562.

Natural philosophers have indeed invented with acute address and ingenuity various instruments for the mensuration of the qualities of things. This is done by applying them in some medium or other, in which they are differently affected, to a graduated scale: and thus they have availed themselves, as well as they can, of that exactness and precision which properly belong to quantity alone.

other kinds, so absolute and unchangeable in themselves, and which admit of having their equality, inequality, and proportion exactly measured and ascertained, a few simple propositions are formed, to which they apply, which are the most general that can be made; the truth and certainty of which, upon comparing their ideas, strike so forcibly upon the understanding, and are so strongly and palpably felt, that as soon as pronounced they irresistibly compel conviction.

Their truth is indeed so direct and obvious, that some philosophers assert that it results from an instinctive impulse of the mind which they call intuition, without the exercise of any act of reasoning at all; whilst others have perhaps more truly and philosophically determined, that where there is an act of comparison, there is an act of judgment, and where there is an act of judgment, there is an act of reasoning¹⁶, although

¹⁶ “Under the word reason, I comprehend the intuition of the truth of axioms” (meaning mathematical): “for certainly to discern the respect which one term bears to another, and from these to conclude the proposition necessarily

the truth results immediately and is therefore properly self-evident, but not intuitive.

These general propositions so formed are the axioms of mathematical science, which easily and securely constitute the secondary principles, from which reason derives all its numerous and extensive operations and into which they are ultimately to be resolved.

And now that we are upon the subject of mathematical principles, I beg leave to make a distinction, which however new, may prove of great and general importance to the more easy discovery, and more successful cultivation of all the different kinds of truth.

Intuitive and self-evident are terms used promiscuously by philosophers and logicians as perfectly synonymous, which has, I apprehend, been the cause of introducing much error and obstruction into general science. To mathematical axioms they have both been attributed with the fullest confidence,

true, is an act of reason, though performed quick or perhaps all at once.”—Wollaston’s *Religion of Nature*, sect. iii. Note.

because their truth is so direct and palpable, that mathematicians think they cannot do them more than sufficient honour by affording them so strong an appellative. And as these axioms are so obvious in formation and so easy in apprehension, no injury has been derived to this science from the mistake. But when philosophers and logicians assert that all other axioms are likewise both intuitive and self-evident, great evils arise from this false idea; as it precludes inquiry, and secures them by an invincible bar against all further examination and reasoning, which from this false persuasion they fastidiously reject and spurn.

So far however from being intuitive, the axioms of all other kinds of knowledge are the consequences and deductions of the most attentive reasoning and laborious investigation, constituting the most useful and honourable part of human learning; whereas if they were intuitive, they would flash direct conviction on the minds, as external objects do on the senses, of all men.

But though self-evidence is very distinct from intuition, all axioms though not intui-

tive may be properly said to be self-evident ; because in their formation reason judges by single comparisons, without the help of a third idea or middle term¹⁷. Thus they are not indebted to any other for their evidence, but have it in themselves ; and though inductively framed they cannot be syllogistically proved. Till axioms are either legitimately established or presumptively assumed, the middle term is indeed no where to be found ; and, so far from deriving from thence their evidence, it derives itself from them. They are therefore properly and logically said to be immediate¹⁸. It is in this sense that all axioms are pronounced and should be understood to be self-evident, because immediate and incapable of syllogistic proof by means of a middle term.

Intuition is therefore properly attributed and should be carefully restricted, to those instinctive faculties and impulses external and internal, which act instantaneously and

¹⁷ See page 46, 47.

¹⁸ *Αἱ γὰρ ἀμεσοὶ προτάσεις ἀρχαί.*—Aristot. *Analyt. Post.* lib. i. cap. 29.

irresistibly¹⁹, which were given by nature as the first inlets of all knowledge, and which we have called the primary principles, whilst self-evidence may be justly and properly attributed to axioms or the secondary principles of truth.

This distinction I am induced to make in the sanguine hope, that if justly considered and attended to, it will effectually contribute to the improvement of all learning in the act of constituting the principles, that is, of distinguishing the evidences and establishing the axioms of all the different parts of knowledge—a point which every philosopher will acknowledge to be of the last importance to general science. “I apprehend,” says one in the conclusion of his remarks on the *Organon* of Aristotle, “it is a subject of such consequence, that if inquisitive men can be brought to the same unanimity in the first principles of the other sciences, as in those of mathematics and natural philosophy (and why should we despair of a general agree-

¹⁹ See page 27.

ment in things that are self-evident?) this might be considered as the third grand era in the progress of human reason²⁰.

SECT. III.

Of Mathematical Reasoning.

THIS species of reasoning is employed in investigating the relations of such abstract and general ideas, as are possessed of those other qualifications which have been noticed in the preceding pages, by reducing them under axioms or secondary principles, which are universal propositions; and the method it pursues is consequently the most perfectly and purely syllogistic¹.

As mathematical science has a subject, so

²⁰ Dr. Reid, in the Appendix to Lord Kaims's third volume of Sketches.

¹ Aristotle says that all mathematical reasoning is reducible to syllogisms in the first of the three figures which is the most pure and perfect, and by which all other kinds of syllogisms that are sound and legitimate are finally to be tried.—Analyt. Post. lib. i. cap. 14.

its reasoning has a language, peculiar and appropriate to itself; but, when analyzed, it is reducible to the following process.

The mathematician may be considered from the beginning, as taking his ideas in their general form. Every proposition composed of such ideas is therefore general; and those which are theoretic are reducible to two parts or terms, a predicate and a subject, with a copula affirmative or negative, but generally the former. If the agreement or the relation between the two terms be not immediate and self-evident, he has recourse to an axiom which is still more general, and which supplies him with a third or middle term². This he compares first with the predicate, and then with the subject, or vice versa. These two comparisons when drawn out in form make two propositions, which are called the premises; and if they happen to be immediate and self-evident, the conclusion consisting of the terms of the question proposed, is said, without further process, to

² The middle term is the subject of a more general proposition than that of the question, and the predicate the same in both.--See page 47 of this volume.

be demonstrated³. Which method of reasoning is conducted exactly in the syllogistic form⁴ delivered by Aristotle with so much labour and particularity in the first book of his *Analytics*⁵.

³ Ἀνάγκη τὴν ἀποδεικτικὴν ἐπισήμην ἐξ ἀληθειῶν τ' εἶναι, καὶ πρώτων, καὶ ἀμέσων, καὶ γνωριμωτέρων, καὶ προτέρων καὶ αἰτιῶν τῆ συμπεράσματος.—Aristot. *Analyt. Post.* lib. i.

⁴ Συλλογισμὸς δὲ ἐστὶ λόγος, ἐν ᾧ τεθέντων τινῶν, ἕτερόν τι τῶν κειμένων ἐξ ἀνάγκης συμβαίνει τῷ ταῦτα εἶναι.—Aristot. *Analyt. Prior.* lib. i. cap. 2.

⁵ Every kind of syllogism is reducible to a categoric, and every categoric syllogism to one of the first figure; and in the premises of a syllogism of the first figure this is done—In the major proposition, or the axiom, the predicate of the question or conclusion (which is the same thing) is universally affirmed or denied of some general idea, which is the middle term: in the minor proposition, the subject of the question or conclusion is always affirmed or asserted to be a part of that more general idea or middle term. And the ground of this reasoning is this—Whatever may be affirmed universally of any idea, may be affirmed of any species or number of particulars comprehended under it, and vice versâ; upon the great logical maxim, “*Dictum de omni et de nullo.*”

Fundamentum, quo nititur modorum omnium jam memoratorum vis (unde probetur conclusivos esse), est postulatium illud quod dici solet “*Dictum de omni et de nullo:*” quod tam per se evidens præsumitur, ut probatione non indigeat. Nimirum, “*Quicquid de subjecto quopiam universaliter affirmatur vel negatur, id similiter vel affirmatur vel negatur de omni eo de quo hoc subjectum dicitur.*” Ut puta, quicquid universaliter affirmatur aut negatur de animali; similiter affirmatur vel negatur de quopiam ani-

Thus to axioms he adds another class of propositions called demonstrations, which though less general are of equal force, and which he applies, in the same way and by the same process, to the proof of relations which lie more distant and concealed. And as it is the peculiar privilege of this science, that all its ideas are general, and these general ideas inexhaustible, in pursuing all their various and multiplex relations, he can produce many demonstrations; which axioms and demonstrations he can apply by the same syllogistic process, to the proof of theorem after theorem almost *ad infinitum*⁶; and

mali, seu de omni eo quod est animal: puta de homine, de bruto, de Alexandro, de Bucephalo, alioque quopiam animali.—Wallis's Logic, book iii. chap. 5: and, if the reader would see at one short view the whole jet and force of all syllogistic reasoning, he cannot do better than read this chapter, "De fundamento Syllogismi, et Modis Figuræ Primæ."

⁶ "The relations of quantity are so susceptible of exact mensuration, that long trains of accurate reasoning on that subject may be formed, and conclusions drawn very remote from the first principles. It is in this science and those which depend upon it, that the power of reasoning triumphs; in other matters its trophies are inconsiderable. If any man doubt this, let him produce in any subject unconnected with mathematics, a train of reasoning of some length, leading to a conclusion, which without this train of reason-

which syllogistic process is (to express it in a few words), to reduce general truths under more general, till they terminate in axioms, which are the most general⁷.

In all mathematical subjects, the art of reasoning is from numbers and quantities which are known, to find or compute those which are unknown. This art in regard to number, is performed by common figures, and this is called arithmetic, or by letters of

ing would never have been brought within human sight. Every man acquainted with mathematics can produce thousands of such trains of reasoning. I do not say that none such can be produced in other sciences.”—Dr. Reid’s Appendix to Lord Kaims’s Sketches, p. 281.

I think Dr. Reid might have pronounced that no such lengthened trains of reasoning can be produced in other sciences. And hence it is that syllogism, which is mathematical and constitutes the Aristotelian logic, is of very little use in other parts of learning. Upon this ground the following observation of the same author is very just. “The ancients seem to have had too high notions both of the force of the reasoning power in man, and of the art of syllogism as its guide. Mere reasoning [syllogistic] can carry us but a very little way in most subjects. By observation and experiments properly conducted, the stock of human knowledge may be enlarged without end; but the power of reasoning alone, applied with vigour through a long life, would only carry a man round like a horse in a mill, who labours hard but makes no progress.—Dr. Reid’s Appendix to Lord Kaims’s Sketches, p. 381.

⁷ See chap. iv. § 2 of this volume.

the alphabet used as arbitrary symbols and quantities, and then it is algebra. With relation to quantity, it is performed by lines and geometrical figures, as symbols of quantities, and then it is known as geometry.

Such is the method of science or demonstration (belonging, I think, to quantity alone⁸), which has been justly celebrated and admired through every age, in which reason advances, by a sublime intellectual motion, from the simplest axioms to the most complicated speculations, and exhibits truth springing out of its first and purest elements, and rising from story to story in a most elegant progressive way, into a luminous and extensive fabric. The certainty of self-evidence attends it through every stage, and every link of the mathematical chain is of equal, that is, the utmost strength.

From the singular elegance and precision

⁸ Here I am under the necessity of differing in opinion from Mr. Locke, who thinks that demonstration is not confined to quantity.—See *Essay*, book iv. chap. ii. § 9, and book iv. chap. iii. § 18. I shall have occasion to consider the opinion of this great man in some future part of these Lectures.

of mathematical reasoning, and the amazing feats which it has performed in its progressive career, from the vast extent to which it can be carried, and its wonderful effects in its application to some parts of physical learning, philosophers ancient and modern have not only held it in a just respect and veneration, but have been so enamoured of its beauty as to embrace and adopt it as the praxis and exemplar of universal logic⁹. This is a mis-

⁹ "Thus we have taken a short view of the so much celebrated method of the mathematicians; which, to any one who considers it with proper attention, must needs appear universal, and equally applicable in other sciences. They begin with definitions. From these they deduce their axioms and postulates, which serve as principles of reasoning; and having thus laid a firm foundation advance to theorems and problems, establishing all by the strictest rules of demonstration. The corollaries flow naturally and of themselves. And if any particulars are still wanting, to illustrate a subject, or complete the reader's information, these that the series of reasoning may not be interrupted or broken are generally thrown into scholia. In a system of knowledge so uniform and well connected, no wonder if we meet with certainty, and if those clouds and darkness which deface other parts of human science and bring discredit even upon reason itself are here scattered and disappear."—Duncan's *Logic*, p. 188. See also p. 224. It was the great error of Aristotle's logic, that on this sole foundation he laboured to erect a universal instrument or organon for the investigation of truth in all other parts of learning, though springing from foundations very different and distinct from mathematical axioms.

take, fatal to the success of all other parts of knowledge, upon which I shall reserve myself to remark more particularly in some future stage of this work. For the present I shall only observe, that in this demonstrative reasoning, not only the middle terms and propositions are general, but that all other terms and propositions are also general. And here likewise I beg leave to appeal to the authority of Dr. Reid, who allows both the ancient and modern logic to be defective as an universal art, whether—"the ancients, who attended only to categorical propositions which have one subject and one predicate, and of these, to such only as have a general term for their subject"¹⁰,"—were not misled in their logic by the mathematics? And also whether—"the moderns, who have been led to attend only to relative propositions, which express a relation between two subjects, and these subjects always general ideas"¹¹,"—were not likewise misled by the mathematics, when they founded the principle of their new

¹⁰ Dr. Reid in the Appendix to Lord Kaimes's third volume of Sketches p. 328.

¹¹ Ibid.

logic upon the axiom, “ Things that agree with one and the same, agree between themselves ¹² ? ” Hence they have confined their reasoning to general relations, and to the agreement and disagreement of ideas of quality as well as of quantity, measured by a third, just as a carpenter measures a piece of timber by the application of his rule ¹³.

¹² Nonnulli autem logici (nostri seculi, aut superioris) posthabita veterum probatione per “ Dictum de omni et de nullo ; ” aliud substituunt illius loco postulatum, nimirum, “ Quæ conveniunt in eodem tertio, conveniunt inter se. ” Atque ad hanc regulam exigentes singulos syllogismorum modos, inde conclusum eunt justam eorum consecutionem. Quique sic procedunt, negligere possunt eam distinctionem modorum perfectorum et imperfectorum ; ut quæ ortum ducit ab ea methodo qua usi si sunt veteres, in probatione sua ab illo dicto.—Wallis’s Logic, book iii. chap. 5.

¹³ Mr. Locke is the great advocate for the perception of the agreement and disagreement of ideas being the criterion of all truth, and in exemplifying this great logical maxim he uses the following words : “ When a man has in his mind the idea of two lines, viz. the side and diagonal of a square, whereof the diagonal is an inch long, he may have the idea also of the division of that line into a certain number of equal parts ; v. g. into five, ten, a hundred, a thousand, or any other number ; and may have the idea of that inch line being divisible or not divisible into such equal parts, as a certain number of them will be equal to the side line. Now, whenever he perceives, believes or supposes such a kind of divisibility to agree or disagree to his idea of that line, he as it were joins or separates those two ideas, viz. the idea of that line, and the idea of that kind of divisibility, and so makes

Of these two logics, both of which are partial and imperfect, the former is entitled to the preference ; because when the general principles are once established, it is the guide to truth in all parts of knowledge ; whereas, out of mathematics pure or mixed the latter can usefully apply to none. Hence the Aristotelian logic, with all its defects, has been rendered still more deficient by the moderns, from its more extensive misapplication¹⁴.

a mental proposition, which is true or false, according as such a kind of divisibility, a divisibility into such aliquot parts, does really agree to that line or no. When ideas are so put together or separated in the mind, as they or the things they stand for, do agree or not, that is as I may call it, mental truth. But truth of words is something more, and that is the affirming or denying of words one of another, as the ideas they stand for agree or disagree."—*Essay*, book iv. chap. v. sect. 6.

¹⁴ On the general subject of this chapter, consult Reid's *Analysis of Aristotle's Logic* ; Brown's *Philosophy of the Human Mind*, lect. 50 ; Stewart's *Elements*, vol. ii. chap. 3 ; Campbell's *Philosophy of Rhetoric*, &c.—*Editor*.

SECT. IV.

Of Mathematical Truth.

WHEN such abstract and general ideas as are appropriated to mathematics in both its branches, which besides the exclusive privileges that have been enumerated are permanent and eternal, are thus syllogistically compared in their numerous relations, and ultimately brought to the test of a few simple axioms or universal propositions which are palpably and self-evidently certain, the truths that result from such an operation of reason must be eminently clear and luminous, bearing down all possibility of doubt, and carrying the most absolute and irresistible conviction. The reason of this greater certainty of mathematical truth is, that all mathematical propositions are acts of mind abstracted from the things themselves, and that the abstract evidence is clearer than that of things whose evidence depends merely on the senses.

This part of learning is therefore distinguished by the name of science, understood in its special and appropriate signification; and it is awarded by Aristotle to the province of the intellect or theoretic mind, as producing abstract, unchangeable¹ and necessary truths², which exclude from the understanding all kind of uncertainty, and also as containing in themselves the end for which they were contemplated³.

¹ Περὶ τῶν μὴ ἐνδεχόμενων ἄλλως ἔχειν.—Aristot.

² Ἄλλ' ἔσι καὶ ἡ μαθηματικὴ θεωρητικὴ. Ἄλλ' εἰ ἀκινήτων καὶ χωριστῶν ἔσι, νῦν ἀδηλον. "Ὅτι μὲν ἦν ἔνια μαθήματα, ἢ ἀκίνητα καὶ ἢ χωριστὰ, θεωρεῖ, δῆλον.—Aristot. Metaph. lib. vi. cap. 1.

³ Ἐπισήμη μὲν ἦν τί ἔστιν, ἐντεῦθεν φανερόν, εἰ δεῖ ἀκριβολογήσθαι, καὶ μὴ ἀκολουθεῖν ταῖς ὁμοιότησι· πάντες γὰρ ὑπολαμβάνομεν, ὃ ἐπισάμεθα μὴ ἐνδέχεσθαι ἄλλως ἔχειν. Τὰ δὲ ἐνδεχόμενα ἄλλως, ὅταν ἔξω τῷ θεωρεῖν γένηται, λανθάνει εἰ ἔστιν, ἢ μή. Ἐξ ἀνάγκης ἄρα ἐστὶ τὸ ἐπιστητόν. Αἰδίων ἄρα. Τὰ γὰρ ἐξ ἀνάγκης ὄντα ἀπλῶς, αἰδία πάντα· Τὰ δ' αἰδία, ἀγένητα καὶ ἀφθάρτα. "Ἐτι διδακτὴ πᾶσα ἐπιστημὴ δοκεῖ εἶναι, καὶ τὸ ἐπιστητόν, μαθητέον.—Aristot. Ethic. Nicom. lib. vi. cap. 3. whence the science had the name Mathematics. Considered in their simple state, this observation may be just; but mathematics, when mixed with physics, or any subject capable of mensuration, produce other important ends, beyond what is contained in themselves. It is when considered in their simple state only, that the power of reason so prominently triumphs, for in this simple state it is alone

CHAP. II.

PHYSICS.

SECT. I.

The Logic of Physics.

THOUGH truth does not appear in the other departments of learning with that bold and irresistible conviction with which she presides in mathematical science, it shines through all, if not interrupted by prejudice or perverted by error, with a clear and useful though inferior strength. And as it is not necessary for his general safety or convenience that the traveller should always enjoy the heat and splendour of the mid-day

that long trains of reasoning can be formed. Of these the mathematician can produce thousands, which, though they may end in themselves, produce this further advantage, that they exercise the mind, strengthen the attention and memory, and habituate the reason to close and continuous efforts of patient investigation.

sun, whilst he can pursue his journey with more pleasure and convenience under the weaker influence of the morning or evening ray; so it is not requisite for the various concerns and purposes of life that men should be led by truth of the most redundant brightness.

On the contrary, it is in every view more useful and expedient for us, situated and circumstanced as we are, since Providence has left us in the confines of much darkness, to act and move under the shades of weaker yet sufficient evidence. Both reason and experience accordingly inform us, that the use and value of truth in general, as it is appointed in all its different divisions to attend us with its light through our transitory journey, does not bear any fixed proportion to its clearness and conviction.

Much of the most useful part of our knowledge is derived from a source different from that which has been just investigated; not from a few general ideas of two kinds of quantity abstracted and separated from all matter, but from the innumerable qualities

of individual and particular things as they are inherent and exist in matter—of all those bodies with which we are by nature every way surrounded, which are perpetually solliciting the external senses, and with whose uses we are immediately and necessarily concerned. To know their inherent powers and properties, their qualities and attributes, their motions and operations, their causes and effects, is to cultivate the various and extensive field of physics or natural philosophy.

Yet this part of learning, however it may differ from pure mathematics, is referred by the Peripatetic philosopher to the same province of mind, the speculative or theoretic intellect; because it derives its principles from those external subjects which it contemplates, and not from the exercise of the will respecting good or evil, nor from the internal resources of the mind contemplating and creating, as we shall hereafter find to be the case with ethics and poetry¹.

¹ Ἐπεὶ δὲ καὶ ἡ φυσικὴ ἐπιστήμη τυγχάνει ἕσα περὶ γένος τὸ τῷ ὄντος (περὶ γὰρ τὴν τοιαύτην ἐστὶν εἰσιανὴ ἐν ᾗ, ἡ ἀρχὴ τῆς κινή-

SECT. II.

Of Physical Principles.

THE evidence of the external senses is obviously the primary principle from which all physical knowledge is derived.

But whereas nature begins with causes, which after a variety of changes produce effects, the senses open upon the effects, and from them, through the slow and painful road of experiment and observation, ascend to causes.

Man appears upon the stage of this material system as on a visionary theatre, in which he looks only upon the exterior of things, as the eye upon a flower that is full-

σεως καὶ ψάσεως ἐν αὐτῇ) δῆλον ὅτι ἔτε πρακτικὴ ἐστὶν ἔτε ποιητικὴ. Τῶν μὲν γὰρ ποιητικῶν ἐν τῷ ποιῶντι ἡ ἀρχὴ, ἡ νῆς ἐστὶν, ἡ τέχνη, ἡ δὴναμὶς τις· τῶν δὲ πρακτικῶν, ἐν τῷ πράττοντι ἡ προαίρεσις. Τὸ αὐτὸ γὰρ τὸ πρακτὸν καὶ προαιρετόν. "Ὡσε εἰ ἡ ἅπαντα διάνοια ἡ πρακτικὴ, ἡ ποιητικὴ, ἡ θεωρητικὴ, ἡ φυσικὴ θεωρητικὴ τις ἂν εἶη.—Aristot. Metaph. lib. vi. cap. 1.

blown, or on an insect in all the pride and beauty of its colours; without observing immediately the different stages through which they have passed, the different forms they have assumed, the different changes they have undergone, and without descending to the seeds and principles from which they spring, and which upon examination will be found totally different both in form and colour. In like manner are the senses, the ultimate criteria of all physical knowledge, liable to be imposed upon and deceived in regard to the qualities and causes, the powers and operations of physical body¹.

The senses are therefore to be assisted by various observations taken with diligence and circumspection, and to be undeceived by different analyses, which divest Nature of her external and compounded form, and lay open

¹ *Ædificium autem hujus universi, structura sua, intellectui, humano contemplanti, instar labyrinthi est; ubi tot ambigua viarum, tam fallaces rerum et signorum similitudines, tam obliquæ et implexæ naturarum spiræ et nodi, undequaque se ostendunt; iter autem, sub incerto sensus lumine, interdum affulgente, interdum se condente, per experientiæ et rerum particularium sylvas, perpetuo faciendum est.—Bacon. Nov. Org. Præf. See also Reid's Essays, vol. ii. p. 22, 290, &c.*

her internal mechanism and construction. Their errors and misconceptions are to be corrected by the use of experiments of different kinds, which penetrate her inmost recesses, and descend to her remotest causes. By the application of such assistance they are enabled, not without difficulty², to leave behind the fallacious exterior, to pass from one phenomenon to another, and as far as human search can go, to judge of the elements of nature.

“ The information which the senses give us,” as the great friend and father of philosophers has observed³, “ is to be examined and corrected by various methods ; for though they deceive us on some occasions, they themselves discover the errors into which they lead. But whereas the errors lie imme-

² *Quin etiam duces itineris (ut dictum est) qui se offerunt, et ipsi implicantur; atque errorum et errantium numerum augent. In rebus tam duris, de judicio hominum ex vi propria, aut etiam de felicitate fortuita, desperandum est. Neque enim ingeniorum quantacunque excellentia, neque experiendi alea sæpius repetita, ista vincere queat. Vestigia filo regenda sunt: omnisque via usque a primis ipsis sensuum perceptionibus, certa ratione munienda.—Ibid.*

³ See Lord Bacon on the Advancement of Learning, *Distrib. Op.* p. 15.

diately before us, the indications of them are to be sought at a great distance.

“The senses are subject to a twofold defect. They may either desert or deceive us. Many subjects⁴ elude their cognizance, however well they may be disposed and free from impediment, either from the tenuity of the whole object or the extreme minuteness of its parts, from the distance of its situation, the slowness or the velocity of its motion, its familiarity to the eye, and from many other causes. And again, where they fully appre-

⁴ Air and fire are bodies of the most universal extent and operation in the material system. And the great Boerhaave, speaking of the latter, makes the following observation:—“So great is the power, so extensive the action, and so wonderful the manner wherein fire acts, that it was anciently held and adored as the supreme God by a nation reputed the wisest of all others. Thus some of the chemists, having found its extraordinary force, took it for an uncreated being, and many of the most eminent among them attributing all the knowledge they had acquired to this instrument, called themselves philosophers of fire, as thinking they could not be dignified by a higher title. There is however nothing more wonderful in the nature of fire, than that whilst it is the chief cause and principle of almost all the effects cognizable by our senses, itself is imperceptible by any sense, being so incomprehensible, by reason of its extreme minuteness, that it eludes our nicest research; so that with many it passes for a spirit rather than a body.”—Boerhaave’s Chemistry.

hend their object, they are not to be securely relied upon ; for the testimony and information of the senses depend on the analogy and constitution of man, and not on those of the universe ; so that to say that sense is the adequate measure or competent judge of things, is an assertion founded in mistake.

To obviate the imperfections of sense, philosophers are under the necessity, by much labour and attention, of calling in aid and assistance from every quarter, in order to supply the deficiency where the senses fail, and also to regulate and rectify them where they vary in themselves. This is effected not so much by the use of instruments as by the help of experiment. For experiments are much more penetrating and subtle than the senses, even when assisted by instruments of the most exquisite contrivance ; I mean such experiments as are ingeniously invented, and applied with skill and address to the elucidation of the very thing which is the subject of inquiry. Philosophers do not therefore rely on the perception of the senses immediately applied, as in their natural and common exercise ; but bring the matter of

judging to this issue, that the senses may judge of experiments, and experiments of things. Thus experiments serve in fact as the religious guardians of the senses, from which every thing in sound philosophy is originally derived, and become the skilful interpreters of their oracles; so that, whilst others only pretend, the true philosopher in reality cultivates and supports the evidence of sense⁵.

SECT. III.

Of Physical Reasoning.

BY such experiments and observations in aid of the external senses skilfully chosen, artfully conducted, and judiciously applied, the philosopher advances from one stage of inquiry to another¹, by a slow but steady pace, in the rational investigation of the general causes of physical truth.

⁵ Consult the Preliminary Discourse of Sir J. Herschel on the study of Natural Philosophy; Playfair's Dissertation on Mathematical and Physical Science; Whewell's Bridge-water Treatise, &c.—*Editor*.

¹ Nonnulli qui experientiæ undis se commiserere, et fere me-

The one great and universal Mind who made all things by his power, and preserves them by his providence, is the first and only cause, operating at all times and in all places, and producing, by an exertion of his will, all the various phenomena of the material system. This first and universal cause however in the ordinary administration of his providence, hath condescended to employ second causes as the instruments of his will, by which he acts. These secondary causes he hath also appointed in his wisdom to operate through every part of his creation by general laws. To trace the hand of the Almighty through all his works, to investigate these general causes and erect them into the laws of physics, is the sublime, the delightful, and honourable employment of the natural philosopher².

chanici facti sunt, tamen in ipsa experientia erraticam quandam inquisitionem exercent, nec ei certa lege militant. Quin et plerique pusilla quædam pensa sibi proposuere, pro magno ducentes, si unum aliquod inventum eruere possint; instituto non minus tenui, quam imperito. Nemo enim rei alicujus naturam, in ipsa re, recte aut feliciter perscrutatur; verum post laboriosam experimentorum variationem non acquiescit, sed invenit quod ulterius quærat.—Bacon. Nov. Org. Præf.

² Newtonus philosophis præcepit, ut à phænominis et experimentis ad eorum causas progrediatur; atque inde ad

From different experiments and observations made on the same individual subject, and from the same experiments and observations made on different subjects of the same kind, by comparing and judging he discovers some qualities, causes, or phenomena, which after carefully distinguishing and rejecting all contradictory instances that occur, he finds common to many. And thus from many collateral comparisons and judgments formed upon particulars he ascends to generals; and, by a repetition of the same industrious process and laborious investigation, he advances from general to more general, till at last he is enabled to form a few of the most general, with their attributes and operations, into axioms³ or secondary principles, which are the established laws enacted and enforced by the God of Nature⁴.

causarum istarum causas, et sic deinceps, donec ad primam causam perveniatur.—Horsley in Edit. Newt. Op. p. 495.

³ *Secundum nos, axiomata continenter et gradatim excitantur, ut nonnisi postremo loco ad generalissima veniatur. Ea vero generalissima evadunt, non notionalia, sed bene terminata, et talia quæ natura ut revera sibi notiora agnoscat, quæque rebus hæreant in medullis.*—Bacon. Nov. Org. Præf.

⁴ See Nov. Org. lib. i. aph. 104, 105.

Ad veram philosophiam pertinet rerum naturas ex causis

This is what Sir Isaac Newton who reduced the philosophy of Bacon to physical practice calls the analytic method :

“ As in mathematics, so in natural philosophy,” he remarks, “ the investigation of difficult things by the method of analysis ought ever to precede the method of composition. This analysis consists in making experiments and observations, and in drawing general conclusions from them by induction, and admitting no objections against the conclusions, but those which are taken from experiments or other certain truths ; for hypotheses are not to be regarded in experimental philosophy. And although the arguing from experiments and observations be no demonstration of general conclusions, yet it is the best way of arguing which the nature of things admits, and may be looked upon as so much the stronger, in as much as the induction is more general ; and if no exception occur from phenomena, the conclusion may be generally pronounced.

vere existentibus derivare : eas vero leges quærere, quibus voluit summus Opifex hunc mundi pulcherrimum ordinem stabilire, non eas quibus potuit, si ita visum fuisset.—Cotes. Præf. in Newt. Princip.

But if at any time afterwards any exception should occur from experiment, it may then begin to be pronounced with such exceptions as occur. By this way of analysis we may proceed from compounds to ingredients, and from motions to the forces producing them; and in general from effects to their causes, and from particular to more general ones, till the argument end in the most general. Such is the method of analysis⁵.”

This method of reasoning, founded on experiment and observation, by which the general ideas and forms⁶ of natural philosophy are invented is purely and exclusively inductive. The schools are not the theatre in which this philosophical logic of physics is displayed⁷. It does not delight in external appearance and ostentatious formality. It

⁵ Newton, sub fin. *Optic*.

⁶ *Inquisitio formarum sic procedit; super naturam datum primo facienda est comparentia ad intellectum omnium instantiarum notarum, quæ in eadem natura conveniunt, per materias licet dissimillimas. Atque hujusmodi collectio facienda est historice, absque contemplatione præfestina aut subtilitate aliqua majore.*—Bacon. *Nov. Org. lib. ii. Aph. 11.*

⁷ *Rejicimus igitur syllogismum; neque id solum quoad principia (ad quæ nec adhibent), sed etiam quoad proposi-*

retires from the clamour of verbal disputation into the retreat of the laboratory or observatory, where in silent investigation and by laborious operations, it lays the foundation of useful and substantial learning. And as it mixes with experiment and observation, and is incorporated with them, it is incapable of being adequately displayed by words and propositions, but is best seen and understood by attending it in the act, and pursuing it minutely through every stage of its analytical progression.

Such is the true and proper logic of physical science, not that which was employed by the ancient philosophers, the disciples of Pythagoras and the Lycæum. These sages (to speak with all reverence of such exalted characters, and to think of them

tiones medias : quas educit sane atque parturit, utcunque syllogismus; sed operum steriles et a practica remotas et plane quoad partem activam scientiarum incompetentes. Quamvis igitur relinquamus syllogismo et hujusmodi demonstrationibus famosis et jactatis, jurisdictionem in artes populares et opinabiles (nil enim in hac parte movemus); tamen ad naturam rerum, inductione per omnia et tam ad minores propositiones, quam ad majores, utimur.—Nov. Org. Præf.

with the gratitude due to their useful labours, without being a slave to their authority⁸), in haste to indulge in their national infirmity,—that vain and ostentatious parade of terms divorced from things and invented by themselves⁹—overlooked the true ground-work of all sound philosophy, experience and induction¹⁰, and erected their notions and hypotheses into arbitrary principles¹¹. Around these, their syllogisms which were no better than sophisms, might revolve with ease, and entertain them with a brood of false theories, which

⁸ Pro certo habeant homines non sectæ nos alicujus aut placiti, sed utilitatis et amplitudinis humanæ fundamenta moliri.—Bacon. Nov. Org. Præf.

⁹ Cum toti sint in rerum nominibus, non in ipsis rebus, sermonem quendam philosophicum censendi sunt adinvenisse, philosophiam tradidisse non sunt censendi.—Cotes. Præf. in Newton. Princip.

¹⁰ De inductione vero dialectici vix serio cogitasse videntur; levi mentione eam transmittentes et ad disputandi formulas properantes.—Nov. Org. Præf.

¹¹ Itaque ordo quoque demonstrandi plane invertitur. Adhuc enim res ita geri consuevit; ut a sensu et particularibus primo loco ad maxime generalia advoletur, tanquam ad polos fixos, circa quos disputationes vertantur; ab illis cætera per media deriventur via certe compendiarum, sed præcipiti, et ad naturam impervia, ad disputationes vero proclivi et accommodata.—Nov. Org. Præf.

they honoured and embraced as the most substantial truths¹².

The experimental and inductive process philosophically conducted was too painful for the lazy, and too silent for the loquacious disposition of the Athenian schools. But what was most its adversary, it was too humiliating for that philosophic pride, unconscious of philosophy, by which they held the human mind in a kind of adoration. They thought, that by its native powers and independent action and reaction on itself, particularly when aided by a logic which assumed to be a universal

¹² The physics of Aristotle are full of those very self-creations which he so severely censures in the Pythagorean school. Οἱ μὲν ἔν καλέμενοι Πυθαγόρειοι, ταῖς μὲν ἀρχαῖς καὶ τοῖς στοιχείοις ἐκτοπωτέρας χρῶνται τῶν φυσιολόγων. Τὸ δ' αἰτίων, ὅτι παρέλαβον αὐτὰς ἐκ ἐξ αἰσθητῶν. Διαλέγονται μέντοι καὶ πραγματεύονται περὶ φύσεως πάντα. Γεννώσι τε γὰρ τὸν ἕρανόν· καὶ περὶ τὰ τέτθ μέρη, καὶ πάθη καὶ τὰ ἔργα, διατηρῶσι τὸ συμβαῖνον· καὶ τὰς ἀρχὰς, καὶ τὰ αἷτια εἰς ταῦτα καταναλίσκωσιν, ὡς ὁμολογεῖται τοῖς ἄλλοις φυσιολόγοις, ὅτι τό γε ὄν τῶτ' ἔστιν, ὅσον αἰσθητόν ἐστι, καὶ περιεῖληφεν ὁ καλέμενος ἕρανός. Τὰς δ' αἰτίας καὶ τὰς ἀρχὰς, ὡσπερ εἶπομεν, ἱκανὰς (ὡς λέγουσι) καὶ ἐπαναβεῖναι καὶ ἐπὶ τὰ ἀνωτέρω τῶν ὄντων, καὶ μᾶλλον ἢ τοῖς περὶ φύσεως λόγοις ἀρμοττέσας.—Metaph. lib. i. cap. 7, which self-creations one of his commentators treats in these contemptuous words: *Novis suis inventis, tanquam simiæ suis catulis, delectantur.*—Joan. Ludov. Havenrut.

and unerring guide, their faculties were able to find out and comprehend universal truth¹³.

The inductive logic has indeed much humbler pretensions, but more efficient operations, stooping from the high presumption of the mind thus raised upon the wings of an imaginary perfection, to the manual and ocular examination of the meanest particulars in the universe, for the ground of its proceedings. So far from having advanced to a state of perfection, it was in their day in its tenderest infancy, and from the obstacles thrown in its way by the syllogistic logic, it remains at the present in a state of slow progression. In the field of natural philo-

¹³ Utcunque enim homines sibi placeant et in admirationem mentis humanæ ac fere adorationem ruant, illud certissimum est; sicut speculum inæquale rerum radios ex figura et sectione propria immutat; ita et mentem, cum à rebus per sensum patitur, in notionibus suis expediendis et comminiscendis, haud optima fide rerum naturæ suam naturam inserere et immiscere.—Bacon. Nov. Org. Præf.

Qui veræ philosophiæ principia legesque rerum sola mentis vi et interna rationis lumine fretum, invenire se posse confidit; hunc oportet vel statuere mundum ex necessitate fuisse, legesque propositas ex eadem necessitate sequi; vel, si per voluntatem Dei constitutus sit ordo naturæ, se tamen homuncionem misellum, quid optimum factu sit perspectum habere.—Cotes. Præf. in Newt. Princip.

sophy, it contemplates such a vast extent and variety of ground, as is sufficient to employ the joint and confederate labours of philosophers of every age and country, assisted by the largest collection and best arrangement of natural history¹⁴, which is the proper and legitimate basis of natural philosophy. On this foundation experience takes its slow but steady course. It first lights the candle, and then by that candle shows the way, beginning with regular and well-conducted experiments, not such as are vague and preposterous, from which it derives axioms, and finally from axioms well

¹⁴ Phænomena universi, hoc est, omnigena experientia, atque historia naturalis, ejus generis, quæ possit esse ad condendam philosophiam fundamentalis. Neque enim excellens aliqua demonstrandi via, sive naturam interpretandi forma, ut mentem ab errore et lapsu defendere ac sustinere, ita ei materiam ad sciendum præbere et subministrare, possit. Verum iis, quibus non conjicere et hariolari, sed invenire et scire propositum est; quique non simiolas et fabulas mundorum comminisci, sed hujus ipsius veri mundi naturam introspicere et velut dissecare in animo habent, omnia a rebus ipsis petenda sunt. Neque huic labori et inquisitioni ac mundanæ perambulationi, ulla ingenii aut meditationis aut argumentationis substitutio, aut compensatio sufficere potest; non si omnia omnium ingenia coierint. —Bacon. Nov. Org. Præf.

established, it descends to new experiments¹⁵.

The more numerous and extensive are the experiments and observations, from which inductive reasoning draws the general conclusion, the more certain will be the axiom, as standing upon a wider and firmer basis; but however numerous and extensive, they must of necessity fall short of the number and extent of nature, which in some cases by its immensity will defeat all possibility of their co-extension, and in others, by its distance lie out of the reach of their immediate application. In order therefore to make his law of general use, and stretch it over the whole extent of nature, the philosopher is obliged to have recourse to analogy; by which he can lengthen out his inductions, which are properly confined to the number of experiments and observations actually made, to all other particulars of the same kind,

¹⁵ Verus experientiæ ordo primo lumen accendit, deinde per lumen iter demonstrat, incipiendo ab experientia ordinata et digesta, et minime præpostera et erratica, atque ex ea educendo axiomata; atque et axiomatis constitutis experimenta nova.—Bacon. Nov. Org. lib. i. Aph. 82.

concluding the axiom to hold good of all¹⁶, and that, not only for the present, but also for the future, till it either be further confirmed and rectified, or contradicted by better experiments and a more extensive and complete induction¹⁷.

Such is that just and philosophic method of reasoning which sound logic prescribes in this, as well as in other parts of learning, by which, through the slow but certain road of experiment and observation, the mind ascends from appearances to qualities, from effects to

¹⁶ Regulæ philosophandi.

Reg. 2. Effectuum naturalium ejusdem generis eadem assignandæ sunt causæ, quatenus fieri potest.

Reg. 3. Qualitates corporum quæ intendi et remitti nequeunt quæque omnibus corporibus competunt in quibus experimenta instituere licet, pro qualitatibus corporum universorum habendæ sunt.

Nam qualitates corporum non nisi per experimenta innotescunt; ideoque generalia statuendæ sunt quotquot cum experimentis generaliter quadrant.—Non à naturæ analogia recedendum est, cum ea simplex esse soleat et sibi semper consona.—Et hoc est fundamentum philosophiæ totius.

¹⁷ Reg. 4. In philosophia experimentalis propositiones ex phænomenis per inductionem collectæ, non obstantibus contrariis hypothesis, pro veris aut accurate, aut quam proxime haberi debent, donec alia occurrerint phænomena per quæ aut accuratiores reddentur, aut exceptionibus obnoxia.—Newton. Princip. lib. iii.

causes, whence by a fair induction from many particular subjects extended by analogy, it forms general propositions concerning the powers and properties of physical body.

When the secondary principles, which constitute the laws of physics, are thus inductively and analogically established, the proper use of syllogism in subjects of natural philosophy is very simple and confined within a narrow circuit. This is only to reduce the particular phenomena which occur under the general propositions, for the truth of which they will account by communicating their own, and present us at once with new and useful discoveries¹⁸. All this is indeed properly and effectually done by a mere superinduction of the principle, or by the application of the general law to the particular instances to which it belongs; and

¹⁸ *Axiomata recte inventa tota agmina operum secum trahunt; atque opera non sparsim sed confestim exhibent.*—Bacon. *De Augm. Scient.* This Sir Isaac Newton calls the synthetic method. “The synthesis consists in assuming the general causes discovered, and established by analysis, as principle, and by them explaining the phenomena proceeding from them and proving the explanations.”—Newton, *sub fin. Optic.*

that, without the formality of a single syllogism, which, in the opinion of the father of philosophers, is not only useless, but injurious in subjects of philosophic investigation¹⁹.

After the general principles and propositions are thus constructed, men who are born with definitions in their mouths, and bred up in the formalities of mode and figure, may indeed entertain themselves and others by playing at sophisms and syllogisms, as children do at hide and seek; but as from this play, we do not expect much useful work, so from the former, we must despair of receiving either additional principles or new discoveries. This idle game has been uselessly played for many ages²⁰. The

¹⁹ Nos demonstrationem per syllogismum rejicimus, quod confusius agat et naturam emittit e manibus. Tametsi enim nemini dubium esse possit, quin, quæ in medio termino conveniunt, ea et inter se convenient (quod est mathematicæ cujusdam certitudinis): nihilominus hoc subest fraudis, quod syllogismus ex propositionibus constet, propositiones ex verbis, verba autem notionem tesseræ et signa sint. Itaque, si notiones ipsæ mentis (quæ verborum quasi anima sunt et totius hujusmodi structuræ ac fabricæ basis) male ac temere a rebus abstractæ et vagæ, nec satis definitæ et circumscriptæ, denique multis modis vitiosæ fuerint, omnia ruunt.—Bacon. Nov. Org. Præf.

²⁰ Si quis in omnem illam librorum varietatem, qua artes et scientiæ exultant, diligentius introspiciat, ubique inve-

master of the Lycæum syllogized before them to little purpose, besides that of promoting perpetual disputation²¹, and of checking all useful and experimental inquiry, arrogating an implicit obedience to a false philosophy by a species of tyranny unexampled in the annals of mankind. And, if it would not spoil their diversion by shocking their devotion to the logic of that gratuitous and hypothetical reasoner, I would venture to lay before them what a true philosopher and logician thought of their employment. “Let men know this as a certain truth, that all subtlety of disputation and discourse of reason, if it be only applied after axioms are invented, is too late and indeed preposterous; and that the true and proper time for subtlety, or at least the principal time,

niet ejusdem rei repetitiones infinitas, tractandi modis diversas, inventione præoccupatas; ut omnia primo intuitu numerosa, facto examine, pauca reperiantur.—Nov. Org. Præf.

²¹ Et de utilitate aperte dicendum est; sapientiam istam, quam a Græcis potissimum hausimus, pueritiam quandam scientiæ videri, atque habere quod proprium est puerorum; ut ad garriendum prompta, ad generandum invalida et immatura sit. Controversiarum enim ferax, operum effœta est.—Ibid.

is that which is employed in making experiments, and subsequently in forming axioms. For the other subtlety only mocks and catches at nature, but can never seize or lay hold of her²²." When they dispute however from principles, which are better founded than the dreams and hypotheses of Aristotle, logicians would do well to recollect, that in physical syllogisms the minor propositions are not general but particular; a circumstance which, philosophically weighed, might put a short period to their disputations, however tenacious men attached to forms and disciplines may be of their ancient privileges, and however willing to wrest every thing to them and them to every thing, and thus to consider their use and application as universal.

But though the common syllogistic logic

²² Hoc vero sciant homines pro certo, omnem subtilitatem disputationum et discursuum mentis, si adhibeatur tantum post axiomata inventa, seram esse et præposteram; et subtilitatis tempus verum ac proprium, aut saltem præcipuum, versari in pensitanda experientia, et inde constituendis axiomatibus. Nam illa altera subtilitas naturam prensat et captat, sed nunquam apprehendit aut capit.—Nov. Org. lib. i. Aph. 121.

can lend no useful aid to physical science, either in its advancement or communication, as there is perhaps nothing in nature without rule and measure, the mathesis is its most useful friend and handmaid.

The subjects of pure mathematics are the ideal forms of quantity separated from body by an act of mind. The subject of physics are the qualities, that is, the motions and affections of things as they exist in body, and produce by that existence various phenomena and effects. To account for these phenomena and effects as a science, by reducing them under the general laws of nature, physics derives its general forms from experiments by induction, and from them erects philosophical axioms. It is in the application of the forms of quantity to the forms of quality, wherever they are capable of accurate mensuration, that the mathematics so advantageously apply to the elucidation and promotion of physical science. In all these cases they are of most essential use, both in the act of deriving the general laws and principles of physics from experiments and phenomena; and also after they are established, they are equally useful

in calculating their particular operations and effects, which are the other phenomena, and by adapting them, with the utmost address and ingenuity to the use, as well as elegance of civil, social, and domestic life. So indispensable indeed are the mathematics, as instruments to the success of our advancement in physical knowledge, that in their operations throughout the extended field of natural philosophy, they are usually denominated *mixed* mathematics.

Motion is a general form of great influence and extent in the wonderful mechanism and economy of nature, to which the forms of number and figure apply, as an affection of various subjects, and capable of various mensuration. They begin with the moving power, considered as a second cause (for with the first eternal cause natural philosophy has no direct concern); or if the physical cause cannot be properly ascertained from experiment and observation, which too often happens, they take a general phenomenon²³

²³ Naturæ vires legesque virium simpliciores ex selectis quibusdam phænomenis per analysin deducunt, ex quibus deinde per synthesin reliquorum constitutionem tradunt.—Cotes. Præf. in Newton. Princip.

established on their authority, which by analogy may sufficiently supply its place. Upon this experimental or analogic foundation, they calculate the force or the quantity of motion produced²⁴; they account for the different kinds of that motion; they show how they are mixed and compounded, what direction and velocity they will consequently possess, and they demonstrate the times and periods in which they are respectively performed.

From this application of geometry and numbers to the motion of bodies on the surface of the earth, we derive the philosophy of mechanics. By their application to the motion of the heavenly bodies, we rise to the philosophy of astronomy. By their application to the motion of various sounds, we are indebted for the fundamental part of the philosophy of music²⁵: all which useful and

²⁴ *Mechanica rationalis erit scientia motuum quæ ex viribus quibuscumque resultant, et virium quæ ad motus quoscunque requiruntur, accurate proposita, et demonstrata.*—Newton. *Præf. in Princip.*

²⁵ *Τὰ ὀπτικά πρὸς γεωμετρίαν, καὶ τὰ μηχανικά πρὸς σερομετρίαν, καὶ τὰ ἀρμονικά πρὸς ἀριθμητικὴν, καὶ τὰ φαινόμενα πρὸς ἀστρολογικὴν.*—Aristot. *Analyt. Post. lib. i. cap. 13.*

liberal departments of learning, with some others, so far as the forms of quantity are concerned, may be allowed to partake of the nature and precision of mathematical science²⁶.

Thus we see with what advantage these two kindred sciences, of which both are originally derived from body, can meet together in a kind of connubial union²⁷, and produce a philosophy which constitutes the

²⁶ *Mixta habet pro subjecto axiomata et portiones physicas: quantitatem autem considerat, quatenus est ad ea elucidanda, et demonstranda, et actuanda, auxiliaris. Multæ siquidem naturæ partes, nec satis subtiliter comprehendendi, nec satis perspicue demonstrari, nec satis dextere et certo ad usum accommodari possint, sine ope et interventu mathematicæ. Cujus generis sunt perspectiva, musica, astronomia, cosmographia, architectura, machinaria et nonnullæ aliæ.—Bacon. de Augm. Scient. lib. iii. cap. 6.*

²⁷ *Δηλοῖ δὲ καὶ τὰ φυσικώτερα τῶν μαθηματικῶν, οἷον ὀπτική, καὶ ἁρμονική, καὶ ἀστρολογία· ἀνάπαλιν γὰρ τρόπον τινὰ ἔχουσι τῇ γεωμετρίας· ἀλλὰ ἡ μὲν γεωμετρία περὶ γραμμῆς φυσικῆς σκοπεῖ· ἀλλ' ἔχῃ φυσικὴ ἡ δὲ ὀπτικὴ, μαθηματικὴν μὲν γραμμὴν, ἀλλ' ἔχῃ μαθηματικὴ, ἀλλ' ἢ φυσικὴ. Ἐπειδὴ δὲ ἡ φύσις διχῶς, τὸ, τε εἶδος καὶ ἡ ὕλη, ὡς ἂν εἰ περὶ σιμότητος τί ἐστὶ σκοποῦμεν, ἔτω θεωρητέον. ὡστ' ἔτ' ἀνευ ὕλης τὰ τοιαῦτα, ἔτε κατὰ τὴν ὕλην. Καὶ γὰρ δὴ καὶ περὶ τούτου διχῶς ἀπορήσειεν ἂν τις, ἐπεὶ ὄνομαί φύσεις, περὶ ποτέρας τῆ φυσικοῦ, ἢ περὶ τῆ ἐξ ἀμφοῖν· ἀλλ' εἰ περὶ τῆ ἐξ ἀμφοῖν, καὶ περὶ ἐκατέρας. Πότερον οὖν τῆς αὐτῆς, ἢ ἄλλης, ἐκατέραν γνωρίζειν;—Aristot. Auscult. Natural. lib. ii. cap. 2.*

richest and brightest gem in the crown of human learning.

This friendly mixture and alliance of physics and mathematics, from which so much honour and advantage have accrued to the cause of physical truth, is an act of fine philosophy; which whether it was speculatively understood by the great Newton, whose labours founded on that connexion produced so many splendid discoveries, is well explained by Aristotle²⁸, whose physics are little better than a heap of vain hypotheses—an illustrious proof that science is never to be raised from its foundation to perfection by the exertions of a single genius, however powerful and extensive; but must advance, through several stages of improvement, on the labours of many. It furnishes also a pointed admonition to every later philosopher, to avail himself of the discoveries of his predecessors.

It is however a truth to be acknowledged and lamented, that the genius of one philo-

²⁸ Nat. Auscult. lib. ii. cap. 2.

sopher being either insensibly warped or voluntarily enslaved by the authority of another, is a circumstance which has often thwarted the advancement of knowledge, and always proved an insurmountable obstacle to the progress and success of learning. It is one of the most difficult and important tasks under which every improver of science has to labour, however independent in his spirit and ingenuous in his views, to know what of the works of his predecessors to adopt, and what to reject. This is a question of the highest importance, but which is of most critical and important determination; in which judgment is often embarrassed, and genius perplexed, and in which memory and prejudice too often usurp their place. As Newton put in execution the precepts and followed the directions of the organum of an abler logician, we may have cause to rejoice upon the whole, that our great English philosopher was not more conversant with the works of the Peripatetic.

It was neither from the principles or reasoning, from the logic or practice of Aris-

totle (which seldom if ever coincided in effect), that Newton astonished the world with such a brilliant train of astronomical discoveries and calculations. These, in addition to the other philosophical inventions and improvements of that extraordinary genius, whilst they reflect the highest honour on the country which gave him birth and education, have immortalized his name and memory. The logic which directed his physical researches pointed out to him a more humble and laborious, but a more honourable and successful road to truth. From the ingenious fictions and plausible inventions of the Stagirite, and from the formal but feeble disputations of his weaker followers, it brought him down to the labour of experiment and actual observation. Instead of the wilds of imagination, it led him to cultivate the field of nature; from mental speculation it drew down his attention to manual operations.

By experiments, ingeniously made and accurately observed, he took the true phenomena of motion as generated by the powers of gravity, elasticity, the resistance of fluids,

and the like ; and analyzed the forces by which it is produced, and of which it is compounded²⁹. To these forces he applied his sublime geometry, which science he advanced far beyond the reach of all former mathematicians, and by this he demonstrated the phenomena of all the curves described, and motions performed by projectiles in every hypothesis that could be framed.

From the astronomical observations of Copernicus and the rules and conjectures of Kepler, two of the ablest astronomers before him, he found the planets revolving round their respective centres in curves and motions exactly similar or the same ; and by a bold and sublime analogy³⁰, which made him the

²⁹ All improvement in learning is progressive, and philosophers are never dishonoured by availing themselves of the inventions of their predecessors or contemporaries. Galileo observed the velocity of falling bodies to increase in the duplicate ratio of the time ; and that projectiles move in a parabola : and Sir Christopher Wren found the equability of motion by experiments on pendulums. See the Scholium at the end of the sixth Corollary of Newton's Principia.

³⁰ Non a naturæ analogia recedendum est, cum ea simplex esse soleat, et sibi consona,—et hoc est fundamentum philosophiæ totius.—Newton. Reg. Philosoph. lib. iii. Princip.

Conclusiones precedentes huic innituntur axiomati “ effec-

first astronomer in the world, from his theory of projectiles, experimentally founded and geometrically confirmed, he extended his philosophy to the celestial bodies³¹, applying to

tuum scilicet ejusdem generis, quorum nempe quæ cognoscuntur proprietates eadem sunt, easdem esse causas et easdem esse proprietates quæ nondum cognoscuntur," &c. —In hac regula fundatur omnis philosophia, quippe, qua sublata, nihil affirmare possemus de universis.—Cotes. Pref. in Newton. Princip.

³¹ Eadem ratione qua projectile vi gravitatis in orbem flecti posset et terram totam circumire, potest et luna vel vi gravitatis, si modo gravis sit, vel alia quacunque vi qua in terram urgeatur, retrahi semper a cursu rectilineo terram versus et in orbem suum flecti: et absque tali vi luna in orbe suo retineri non potest. Hæc vis, si justo minor esset, non satis flecteret lunam a cursu rectilineo: si justo major, plus satis flecteret, ac de orbe terram versus deduceret. Requiritur quippe ut sit justæ magnitudinis: et mathematicorum est invenire vim, qua corpus in dato quovis orbe data cum velocitate accurate retineri possit; et vicissim invenire viam curvilineam, in quam corpus e dato quovis loco dato cum velocitate egressum data vi flectatur.—Newton. Princip. Mathem. Def. v.

Without detracting from the merit of Sir Isaac Newton as an astronomer, which is so great that nothing can diminish it, truth and justice require it should be acknowledged, that the application of projectile to celestial motion, which he improved to such wonderful and important purposes, was made by one before him.

“Certissimum hoc est et ab omnibus concessum, motum planetarum verum nec esse perfecte circulem, neque perfecte æqualem. Testantur enim observationes, idque ultra omnem disputationem, figuram orbitæ planetariæ esse ellipticam sive ovalem, et a circulo deficientem; motumque ejus in hoc elliptico inæqualem esse, et pro distantia sua a

them the same forces and mathematical calculations, for the phenomena of which

sole intendi ac remitti.—Ultro se offerunt causæ physicae et naturales, quæ talem motum necessitate geometrica describunt.—Per causas physicas veritati satisfaciamus; ut enim planeta legibus magneticis moveatur, quid quæso impedit, cum idem in aliis exemplis aperte videamus?—Projiciatur plumbum aliquod in altum, surgit primo velociter, deinde tardius, dum tandem stationarium in terram recidat continuo velocitatis incremento, atque ita motum librationis describit.—Oritur ea libratio in linea recta ex pugna virtutis illius quam manus tua illi infudit, una cum virtute telluris magnetica, qua omnia gravia ad se attrahit, ut magnes ferrum. Nihil hic opus est, ut circulos nescio quos in ære somnietur, ubi causam naturalem ante oculos habemus. Et quæso quid est quod in motu planetarum, ubi eadem commoditas non deest, causam veram a natura ipsa tot exemplis confirmatum, fictitio circulorum somnio commutaremus.”—*Jeremiæ Horroccii Liverpooliensis Opera Posthuma, Disp. vi. cap. 1.*

When we compare this extract with those above, and indeed with the whole plan of his *Principia*, we cannot help concluding that Sir Isaac Newton made these broad and pointed hints of Mr. Horrox the basis of his astronomy. He acknowledges this philosopher, who died about the year that he was born, to have been the first who discovered the moon's motion to be in an ellipse about the earth, with its centre in the lower focus; and that this invention was improved by Halley, who placed the centre of the ellipse in an epicycle with its centre revolving uniformly about the earth, from whence the inequality in the progress and regress of the apogee, and in the quantity of eccentricity is deduced. (See *Princip. lib. iii. prop. 35 Schol.*) The philosophical tract alluded to by Sir Isaac is entitled *Nova Theorea Lunæ*, published after the author's death by Dr. Wallis; and in the same publication is that other tract *De Motu Siderum*, from which the extract above is taken, and which our great

they most exactly and wonderfully accounted.

astronomer must undoubtedly have seen, as he was particularly conversant with every thing that came from or through the hands of Dr. Wallis.

This philosopher was the first who, in 1639, after detecting the fallacies of the Lansbergian tables and correcting them, by the use of Kepler's, which he improved, calculated and took the observation of that rare and decisive phenomenon, the transit of Venus, in which Kepler had failed. This important observation, by which the sun's parallax and distance from the earth are more justly ascertained, he published in a work entitled *De Venere in Sole Visa*, a few weeks before his death; and he had a much greater work in hand, in which he had made considerable progress. The subject of this was, in the first part, to refute the hypothesis of Lansberg, by which he had been misled; which is the work collected and published by Dr. Wallis: and the second part was still more important, intending to found a new philosophy upon the basis of sound experiment and accurate observation, in which he adopted the Keplerian hypothesis corrected and improved. But though he had made such advances in this new philosophy, as from it to calculate and construct an ephemeris, he had not so adjusted his materials and committed them to paper, that they could be collected and arranged for publication. An idea of his general scope may however be collected from what is incidentally said in the tract *De Motu Siderum*, inserted in the publication mentioned above. "*Causa vera est physica, sol nempe conversione sui corporis reliquos planetas legibus magneticis secum rapit in gyrum, non aliter quam terra lunam, nubes, et reliqua in altum projecta, magnetica hac virtute secum circumvehit, ut doctissime probat Keplerus. Causam autem excentricitatis male (ut mihi videtur) tradit. Illam ego fibris magneticis quas ille in corpore planetarum fingit tribuendam non censeo, sed inertiae eorum corporali, qua locum suum tueri conantur adversus fortiolem solis*

By this theory founded and established in projectile motion, and thence by a vast ex-

virtutem. Philosophiam hanc alio tempore fusius exponam, ejusque ope sperare ausim, ipsum creationis momentum ex motibus cœlestibus (saltem probabilissime) demonstrare. In presens hoc ago, ut studiosiorum animos a vanis illis et fictitiis circularum somniis, ad naturalem et physicam magis causarum disquisitionem revocarem.—Exempla multa dari possunt eorum quæ per leges naturales et magneticas in circuitum rapiuntur.—Videmus terram magnetica sua vi nubes et reliqua sursum projecta abripere in gyrum.—Docet igitur hic nos experientia figuram circularem per leges magneticas generari posse, cur illud de stellis dubitemus, quod in aliis verum cernimus?—Ostendimus nos philosophiæ nostræ familiare exemplum.—Philosophiam nostram ab ipsa natura ultro oblatam nos grati accepimus: frustra illi ad causas fictitias, et pro lubitu commentas confugiunt.”

That every philosopher has an absolute right to avail himself of the labours and discoveries of his predecessors, as a legacy freely given him, is a privilege which philosophy always claims. It is however a tribute justly due to the memory of this extraordinary genius, whilst we regret the loss of his more valuable works, to acknowledge from what has been saved, that he was principally instrumental in calling philosophy out of the regions of fictitious invention, and putting her on the investigation of the physical causes of things from experiments and observations; that he not only made the application of projectile motion to the analogical illustration of celestial, but also assigned the forces both projective and attractive on which all geometrical calculations are founded; and that, without injuring the immortal fame of his great successor, he may be fairly considered as the forerunner of Newton. He mentions the vis inertię of matter in totidem verbis; and as to the attractive force, whether it be that of magnetism or gravitation, is immaterial; and indeed Sir Isaac himself, in the beginning of his *Principia*, is quite indifferent both as to its name and

ertion of mind translated to celestial, he confirmed the observations of these philosophers; demonstrated their hypotheses and conjectures³²; and enacted on a sound

nature: (vel vi gravitatis, si modo gravis sit luna, vel alia quacunqve vi, quâ in terram urgeatur).

That all bodies in reference to the earth as their centre, and all bodies in reference to the sun as their centre and moving in a sphere, are acted upon and varied in their motions and spheres, according to their respective distance, by some physical cause or causes from which their phenomena could be geometrically demonstrated, was the general doctrine of Horrox. Halley, observing the surfaces of the planetary spheres to be as the squares of their radii, found the force at several distances to act reciprocally as the squares. And Newton demonstrated, that a planet must revolve in an ellipsis about the centre of force in the lower focus acting reciprocally as the square of the distance, and that with a radius drawn to that centre, it must describe areas proportionable to the times; particularizing and completing the mathematical calculation, and carrying it through all the celestial phenomena. All which might probably have been done by Horrox, had he lived to execute his work; but this admirable young man of illustrious genius though humble birth died in the year 1641, at the age of twenty-three!

³² It is Kepler's first rule, "That the same planets describe equal areas in equal times;" and Sir Isaac Newton demonstrated from thence, "that the planets are attracted towards the sun as their centre." Kepler's second rule is, "That the squares of the periodical times are as the cubes of the transverse axis of their orbits;" and Sir Isaac demonstrated "that the force is reciprocally as the squares of the distance;" from which duplicate ratio he demonstrated the rule. It is Kepler's third rule, "That the orbits of the planets are oval and probably elliptical, having the sun in the

foundation the laws of the whole planetary system, which, on finding their truth confirmed by repeated facts and continued experience, he called the mathematical principles of astronomy³³.

From these principles or general laws of motion, by the same geometrical calculations, he deduced the stupendous theory of the elliptical orbits of the planets both primary and secondary, of the spaces through which they pass, of the different velocity with which they move, both in respect of each other and of themselves in the different stages of their ethereal journey, of their relative times and respective situations; and crowned this amazing system of the heavens, by his new philosophy of the motion of the comets, the moon and the tides.

For the mathematical foundation of his astronomy, as the effects and motions were the same or similar, he assigned the same or

focus;" and Sir Isaac demonstrated "that the orbits are really elliptical, and that the sun is in the lower focus."

³³ Principia tradidi a mathematicis recepta et experientia multiplici confirmata.—Newton. Præf. in Princip.

similar forces existing in nature, as the efficient causes both of mechanical and celestial motion³⁴. And truly whether in the act of deriving his principles from the projectile phenomena, or subsequently for the purpose of applying them to the planetary, it was necessary to analyze the elliptical motion of the heavenly bodies into a compound of two simple motions in right lines³⁵ produced by

³⁴ See his *Regulæ Philosophandi* prefixed to the third book of the *Principia*.

Having founded his astronomy on the analogy between the phenomena of projectile and planetary motion, from the phenomena he pushed the analogy to the forces as the efficient causes of both. “*Despiciamus,*” says Mr. Cotes in his preface, “*qualis sit in terrestribus natura gravitatis, ut deinde tutius progrediamur ubi ad corpora cœlestia longissime a sedibus nostris remota perventum fuerit;*” which is more fully explained in the following words: “*Videamus jam comparatione instituta inter planetarum vires centripetas et vim gravitatis, annon ejusdem forte sint generis. Ejusdem vero generis erunt, si deprehendantur hinc et inde leges eædem, eædemque affectiones.*”

³⁵ The projective impulse given to a stone being the cause of its ascent in the air, and its own weight that of its descent to the earth, he adopted projection and gravitation or the centrifugal and centripetal forces, in their compound operation both on the projectile and planet, as the causes of their similar motions: and these forces he made the mechanical foundation of his *Principia*. “*Mechanica rationalis erit scientia motuum qui a viribus quibuscunque resultant, accurate proposita ac demonstrata.*” And, after his *Principia* were formed, these and similar forces are the subjects upon

the action of these different forces. This might also be useful for the purposes of teaching and demonstration; just as we find it necessary, in all parts of science, to separate what in nature is inseparable, for the convenience and assistance of the understanding. The planetary motions may however be simple and uncompounded, as they most probably are (since no experiments can be tried in these distant regions); and the astronomy of Newton, which is only the application of his mathematical principles to

which they were to operate in the demonstration of other phenomena. “*Nos ea tractamus quæ ad gravitatem, levitatem, vim elasticam, resistentiam fluidorum et ejusmodi vires, seu attractivas seu propulsivas, spectant; et ea propter hæc nostra tanquam philosophiæ principia mathematica proposuimus. Omnis enim philosophiæ difficultas in eo versari videtur, ut a phænomenis motuum investigemus vires naturæ, deinde ab his viribus demonstremus phænomena reliqua.*” This is professedly the design and conduct of his great astronomical work. “*Et huc spectant propositiones generales quas libro primo et secundo pertractavimus. In libro autem tertio exemplum hujus rei proposuimus per explicationem systematis mundani. Ibi enim ex phænomenis cœlestibus, per propositiones in libris prioribus mathematice demonstratas, derivantur vires gravitatis quibus corpora ad solem et planetas singulas tendunt: deinde ex his viribus, per propositiones etiam mathematicas deducuntur motus planetarum, cometarum, lunæ, et maris.*”—Newton. *Præf. in Princip.*

their mensuration from their analogy to projectile motions, did not at all require that the forces of projection and gravitation, however useful their supposition, should be assigned as their real existent causes³⁶. It is sufficient for the analogy, on

³⁶ Sir Isaac Newton was doubtless the first astronomer in the world; and his great merit consists in the application of geometry to the phenomena of motion, which he resolved into two general powers or causes, for the purpose of applying his mathematical calculations with effect to discover the principles of motion in general, and by them to demonstrate the phenomena of the solar system—a stupendous exertion of the human mind. But men who have gone far, have sometimes in the laudable zeal for knowledge and the perfection of their science, been carried beyond the bounds of truth in attempting to go farther. It was sufficient for the purpose of astronomy (which differs from physics properly understood, inasmuch as it consists in the calculation of effects, whatever the causes may be) to suppose the existence of the forces assigned; for whether a combination of the two forces be the real cause of the celestial motions, does not at all affect the truth and utility of the calculations founded upon them, which would demonstrate the phenomena equally as well upon the hypothesis, and be equally convincing when confirmed by experience, which would crown the science.

Thus a geometrician can work with imaginary forces, as well as with real ones; and, as an astronomer, in calculating the celestial motions, he had nothing to do with investigating the celestial cause; for he himself declares that his principles are mathematical, not physical (p. 356). And Dr. Berkeley has well observed, that “what is said of forces, whether attracting or repelling, is to be regarded only as a mathe-

which the whole philosophy is founded, that the phenomena of motion are known, from experiments and observations, to be the same in both instances; that the principles or general laws, mathematically established from the forces of the one, are transferred to

mathematical hypothesis, and not any thing existing in nature"—(Siris). Though Sir Isaac may be totally wrong as to the causes, he may be totally right as to the laws of celestial motion, ascertained by figures and confirmed by facts. To ascertain the laws was the end of his philosophy.

To the same phenomena as effects, his philosophy attributes the same existent causes, by an axiom founded more on the authority of antiquity, than on the truth of things. To investigate and assign the true causes of things, is a much more hazardous task than philosophers are willing to allow. Because the curve described by a planet is of the same species, and the motion similar to those of a projectile, to infer that therefore the cause is actually the same, is a conclusion more than the analogy, on which his astronomy is founded, either requires or warrants: for the curves of both are the same with that produced by the simple act of cutting a piece of wood of a certain shape in a certain direction, but it cannot be therefore concluded that the causes are the same.

That the First Cause of all motion, projectile or astronomical, incessantly acting in his providential care according to general laws, is one and the same, is most true. But whether he may not move the grander wheels of his material system by a more immediate act of his omnipotent mind, whilst he produces the same apparent effects or similar motions on this earth, by the operation of second causes; or, whether he does not produce the heavenly motions by second causes either different in themselves, or compounded

the phenomena of the other; and that the proofs and operations deduced from these principles, in the latter case, are confirmed by facts and experience, the first and final test of truth. It is enough for his immortal honour, that his astronomy, thus founded on mechanics, has anticipated and predicted all the stupendous revolutions of the heavens; that it has surmounted innumerable difficulties, and demonstrated what was before beyond the reach of human observation, and has erected on a mathematical foundation all those celestial facts and observations into a system at once sublime and luminous.

differently, from those which act upon projectiles, as no experiments can be instituted in these distant regions, are points worthy the consideration of a philosopher.

But there are many motions upon the earth different from that of projectiles, which may probably lay the foundation of an analogy to the celestial motions; as that of fire, which is directly opposite to gravitation. We have heard of a foreigner [Boscovich] projecting an astronomy on the principle of repulsion: and our own countryman, the ingenious Mr. Jones, has assigned a principle of planetary motion grounded on experiment, totally different from the Newtonian forces; and which, if the actual causes are to be given, is much more simple, and in many respects less objectionable. (See his *Essay on the Principles of Natural Philosophy*.)

Had this great and good man been content to rest his astronomy on the basis of this analogy confirmed by repeated facts and uniform experience³⁷; and left the causes of the celestial motion to Him, many of whose ways are above all human investigation, his philosophy would have maintained the same dignity and value, equally useful to all the purposes of civil and social life, and equally acceptable to the contemplative student; without being involved in those absurdities and encumbered with those difficulties which even the genius of a Newton was unable to surmount³⁸, and which his followers have

³⁷ The analogy on which astronomy is founded concerns properly the phenomena and apparent effects, and need not, perhaps cannot, ever extend to the real causes. Dr. Clarke, the learned advocate and defender of Newton, in his contest with Leibnitz, after many a struggle, was obliged to bring the matter at last to this issue; where he says, that "attraction is not a cause, but a phenomenon or effect discovered by experience, whatever be the cause of it, to which mathematical calculations are usefully applied."—P. 355 and 356.

³⁸ To establish his projection or centrifugal force, according to his first axiom, he was obliged to invent a perfect vacuum; but then, for his gravitation or centripetal force a vacuum would not do; and he was brought to great difficulties, [see his Letter to Dr. Bentley], and at last, to the

laboured in vain to evade or palliate³⁹; without being so liable to be abused and

necessity of conjecturing a subtle ethereal fluid, as a medium, to pervade the universe [see *Opt. Quæst.* 18, 19, 20, 21]: “And thus,” says Mr. Jones, “he solved the government of the created world by a nostrum which hath never yet been understood.”

³⁹ In justice to the Newtonian Philosophy, I cannot avoid transcribing the Apology, made in the Recension of the Controversy with Leibnitz, from its last and ablest edition, as it contains the substance of the defence adopted by the followers of Newton:

Philosophia porro, quam in Principiis suis atque Opticis Newtonus excoluit, est experimentalis: illa scilicet, quæ causas rerum non fidentius docet, quam per experimenta confirmari queant; neque implenda est opinationibus, quæ per phænomena nequeunt probari. Et ideo in Opticis suis, res experimentis firmatas ab illis, quæ incertæ adhuc manent, distinxit Newtonus; et incerta aliquot ejusmodi, sub finem Opticorum, ut quærenda proposuit. Eandemque ob causam, in Principiorum præfatione cum memorasset motus planetarum, cometarum, lunæ ac maris, ceu in libro illo de gravitatis theoria deductos, hæc addidit: “Utinam cætera naturæ phænomena ex principiis mechanicis, eodem argumentandi genere, derivare liceret. Nam multa me movent, ut nonnihil suspicer, ea omnia ex viribus quibusdam pendere posse, quibus corporum particulæ, per causas nondum cognitæ, vel in se mutuo impelluntur, et secundum regulares figuras cohærent, vel ab invicem fugantur, et recedunt: quibus viribus ignotis, philosophi hactenus naturam frustra tentarunt.” Et sub finem ejus libri, in secunda editione narrat, ut, præ inopia experimentorum tanto negotio sufficientium, non aggressus sit leges actionum illius spiritus, sive agentis, describere, per quem efficitur hæc attractio. Quin et eandem ob causam de gravitatis causa nihil pronunciat; quod nulla experimenta, sive phænomena, ad manum

perverted, by the artful and evil inventions of the human mind, to oblique and sinister

essent, quæ causam illam certo indicare possent. Atque hoc in Principiis suis, sub ipso initio, abunde declaraverat, his verbis: “Virium causas et sedes physicas jam non expendo.” Et paulo post, “Voces attractionis, impressus, vel propensionis cujuscunque in centrum, indifferenter, et pro se mutuo promiscue usurpo; has vires, non physice, sed mathematice tantum considerando. Unde caveat lector, ne per hujusmodi voces cogitet me speciem vel modum actionis, causamve aut rationem physicam alicubi definire; vel centris, quæ sunt puncta mathematica, vires vere et physice tribuere; si forte aut centra trahere, aut vires centrorum esse dixerò.” Et sub finem Optices: “Qua causa efficiente hæ attractiones [sc. gravitas, visque magnetica et electrica] peragantur, hic non inquirò. Quam ego attractionem appello, fieri sane potest, ut ea efficiatur impulsu; vel *alio aliquo modo nobis incognito*. Hanc vocem attractionis ita hic accipi velim, ut in universum solummodo vim aliquam significare intelligatur, qua corpora ad se mutuo tendant; cuicunque demum causæ attribuenda sit illa vis: nam ex phænomenis naturæ illud nos prius edoctos esse oportet, quænam corpora se invicem attrahant, et quænam sint leges et proprietates istius attractionis, quam in id inquirere par sit, quænam efficiente causa peragatur attractio.” Pauloque inferius, easdem attractiones tanquam vires considerat, quas in rerum natura existentiam habere, licet causæ earum nondum sint cognitæ, per phænomena constat; distinguitque eas a qualitativis occultis, quæ a specificis rerum formis fluere existimantur. Et in scholio sub extremum Principiorum, cum gravitatis proprietates memorasset, hæc addidit: “Rationem vero harum gravitatis proprietatum ex phænomenis nondum potui deducere; et hypotheses non fingo. Quicquid enim ex phænomenis non deducitur, hypothesis vocanda est; et hypotheses, seu metaphysicæ, seu physicæ, seu qualitatum occultarum, seu mechanicæ, in

purposes ; and without being made objective, however undeservedly, to the principles and

philosophia experimentalis locum non habent.—Satis est, quod gravitas revera existat et agat secundum leges a nobis expositas, et ad corporum cœlestium et maris nostri motus omnes sufficiat.” Jam vero post hæc omnia, quæ consulto præmonuerat Newtonus, quis non miretur, ideo eum a quoquam sugillari, quod causas gravitatis aliarumque attractionum non per hypotheses explicet? quasi criminis loco esset, certis esse contentum, incerta vero dimittere.—Newtoni Opera Edit. Horsley, vol. iv. p. 492—494.

The cause of Newton is here pleaded with all the candour and ability becoming the very learned and ingenious editor of his works. Of causes in the great chain of nature, there are many kinds subordinate to each other; and, allowing that Sir Isaac never intended to assign the physical cause of his forces; as he made these forces, whatever be their cause, the basis of his astronomy, the question seems to be, whether he considered them existent in the heavens and founded on experiment and phenomena; or whether he only supposed them to be existent, for the purpose of applying his geometrical calculations? If he thought them really existent, he assigned them as the physical causes of the celestial motions, though he did not know their causes. And that he did so is, I think, clear both from himself and from his editor. Mr. Cotes says in his preface, “*Constat planetas in orbibus suis retineri per vim aliquam in ipsos, perpetuo agentem, constat vim illam dirigi semper versus orbitarum centra, &c.—Ideone gravitatis occulta causa dicetur, eoque nomine rejicietur a philosophia, quod causa ipsius gravitatis occulta est et nondum inventa.—Etenim causæ continuo nexu procedere solent a compositis ad simpliciora.—Causæ simplicissimæ nulla dari potest mechanica explicatio.”*

Sir Isaac Newton was certainly much perplexed about his forces. They were indispensable to his astronomy either as real or supposed; and if he had rested the whole simply

doctrines of that religion, of which he lived in the belief and practice, and in which he reposed his dying hope⁴⁰.

upon the analogy between projectile and celestial motion, according to the few plain words in his fifth Definition,—“*Eadem ratione qua projectile vi gravitatis in orbem flecti posset, et totam terram circumire, posset et luna, si modo gravis sit, vel alia quacunque vi,*”—without saying any more, he would have saved himself and followers much difficulty and trouble, and have fixed his astronomy upon a foundation sufficiently strong, against which no fair objection could have been brought. And this he might have done without any hypothesis (which he so justly rejects in his Philosophy), for he had found by observation and experiment, that the celestial motions were exactly similar to projectile motions, which was a sufficient foundation for an analogical conclusion.

⁴⁰ Upon this part of the Newtonian Philosophy, some materialists have hinged, or endeavoured to hinge, their absurd and preposterous system; and it is a misfortune ever to be lamented, in this dark and imperfect state of things, that the errors of great and good men, however innocent or even laudable in themselves (and this is one of the worst plagues of error), lead weaker and less virtuous minds into a labyrinth of fatal mischief.

And here I feel myself in duty bound, both to the memory of the immortal Newton and to an able philosopher who transmitted this defence in a private letter soon after the first edition of this work, to insert the following remarks of Dr. Reid.—See the Letter in the Appendix to the Memoir.

Two living authors, with a view of subverting this foundation of materialism and all the absurdity and impiety which it generates, have opposed this infirm part of the Philosophy of Newton with arguments, which on both sides are, I think, full and incontrovertible. But, after subverting the forces of attraction and repulsion, in assigning what each supposes to

But whilst from this mixture and connection of physics and mathematics, philosophers

be the true cause of celestial motion, they draw two ways diametrically opposite to each other; which may probably be an omen that the true and proper cause is not to be known.

The author of "Ancient Metaphysics" assigns a metaphysical, Mr. Jones's Philosophy a physical cause; and, equally zealous for the interests of religion, they are both the avowed enemies of atheism. The former attempts to revive and support the ancient doctrine of Mind or the Deity himself, as the first cause, animating and moving every part of his material creation by an immediate influence, and "perpetually operating upon it by incessant impulses." The latter attributes all motion to the action of matter upon matter, maintaining the agency of second causes, under the direction of God the moral governor of the world, and the primary cause of all things.

They perfectly agree in acknowledging God, or the Universal Mind, to be the first and universal cause of all things; so that, upon either supposition, the cause of Theism is safe. But the one represents him in the exercise of his providential government, as acting according to fixed and general laws of his own, and operating through every part of the natural material system mediately and by the instrumentality of his creatures, that is naturally; whilst the other describes him as acting upon all particular material subjects, in different ways, immediately and by the direct operation of his divine power, supernaturally if not miraculously, according to general laws. Which of the two hypotheses redounds more to the honour of God and the interests of his religion, as their supporters appear to be actuated by the purest and most benevolent motives, is a question I would not undertake positively to decide.

I must however observe, so great is the perverseness and

are deriving a train of sublime and splendid truths, by which the heavens are enlightened

obliquity of the human mind, that both, however opposite, have at different periods been abused to the support of atheism. The immediate operation of the Universal Mind animating and actuating all matter with every kind of life and motion, was by the Chaldaic and some old philosophers, perverted into the doctrine of materialism; in consequence of which they taught whole nations to worship the element of fire, as the subtlest and sublimest part of the soul of the world. Under a similar persuasion, a Roman philosopher of great moral reputation has the following question,—“*Quid est aliud natura, quam Deus, et divina ratio toti mundo et partibus ejus insita?*”—(Seneca de Benef. lib. iv.) Nor need we wonder at this, when we read the following lines in a poet of our own of only the last age:

“ All are but parts of one stupendous whole,
Whose body nature is, and God the soul.”

But not so Newton,—“*Deus omnia regit, non ut anima mundi, sed ut universorum Dominus, et propter dominium suum παντοκράτωρ dici solet.*” On the other hand, some more modern materialists have founded their doctrines on the agency of second causes, on matter acting upon matter, by virtue, as they suppose, of its organization or other inherent power, making the material world into an automaton, moving itself independently of any other cause. And either the reason of men or the reason of things is so totally changed, that to defeat this impious and modern doctrine, the other and ancient is revived as the only antidote, making God himself the sole agent, by whose immediate power, exclusive of the operations and instrumentality of all material agents, the meanest effects are every hour produced. By these weapons we are taught we can alone obtain a complete triumph over atheism. But whether this triumph will be

from pole to pole, they should never in the pride of science lose sight of the nature and

well founded in the event, may be left I think to be decided by the judgment of Lord Bacon, supported by the verdict of Plato.—“Eos, qui autumant nimiam scientiam inclinare mentem in atheismum, ignorantiamque secundarum causarum pietati erga primam obstetricari, libenter compellarem Jobi quæstione: ‘An oporteat mentiri pro Deo, et ejus gratia dolum loqui conveniat, ut ipsi gratificemur?’ Liqueat enim, Deum nihil operari ordinario in natura, nisi per secundas causas, cujus diversum credi si vellent, impostura mera esset, quasi in gratiam Dei, et nihil aliud quam auctori veritatis immundam mendacii hostiam immolare. Quin potius certissimum est, atque experientia comprobatum, leves gustus in philosophia movere fortasse ad atheismum, sed pleniores haustus ad religionem reducere. Namque in limine philosophiæ, cum secundæ causæ, tanquam sensibus proximæ, ingerant se menti humanæ, mensque ipsa in illis hæreat atque commoretur, oblivio primæ causæ obrepere possit. Sin quis ulterius pergat, causarumque dependentiam seriem et concatenationem, atque opera providentiæ intueatur, tunc secundum poetarum mythologiam facile credet, summum naturalis catenæ anulum pedi solii Jovis affigi.”—De Augm. Scient. lib. i.

Ταύτ' ἔν πάντ' ἔστιν τῶν συναιτιῶν, οἷς ὁ Θεὸς τὴν τῆ ἀρίστου τάξιν κατὰ τὸ δυνατόν ἀποτελεῖ.—Plato.

Between these two rocks of atheism is the middle way, in which sound theism is always to be found, which was pointed out both by Plato and Bacon, and in which Newton, even if mistaken in his celestial forces securely trod in the exercise of philosophy and religion:

“The main business of natural philosophy is to argue from phenomena without feigning hypotheses, and to deduce causes from effects, till we come to the very First Cause, which certainly is not material.”—Newton’s Optics, p. 343.

In this middle way, the very learned author of “Ancient

extent of that mixture and connexion. Whilst they join them in operation, they should be

Metaphysics” might rest secure of his theism ; and for the improvement of sound learning, he may safely join the ingenious Mr. Jones, in the following sublime and truly philosophical sentiment—“ With him who is taught that the true God is distant from, and above the world of matter, though virtually present in it by a providential inspection and superintendence, the mechanism of the natural world will only serve to enlarge his ideas, by setting before him the visible evidence of that divine Wisdom, which with such exquisite contrivance and such simplicity of design, hath adapted physical causes to the production of their respective effects.”—Jones’s Philosophy, p. 8.

By overlooking the intermediate links in the great chain of causes, and by resolving every effect into the immediate and personal act of Deity, this learned writer should reflect, that he not only injures the beauty and contrivance, the connection and dependence so admirable in the economy of nature, but puts a check upon the progress of natural philosophy, which consists entirely of an inquiry into second causes ; and also, that, by introducing a sort of “ miraculous interposition, he is confounding the established order of natural things, and introducing a method of philosophizing, which would give a sanction to every ridiculous hypothesis that doth not quite come up to an impossibility.”—Jones’s Philosophy, p. 115.

In allowing the Deity to act mediately by the instrumentality of his own creation, we can be in no danger of supposing that matter is possessed of thought and motion in itself, or that it is able to make and support the world : and “ the wisdom of God will be infinitely magnified” in our conception “ if he be found to bring about those things by the mechanism of second causes, to which philosophers have determined the divine power itself to be absolutely necessary. We may hence derive the only rational en-

careful not to confound them in contemplation, so as to mistake the principles of the one for the principles of the other; which will finally and inevitably lead to error.

That every particular science has principles of its own, which are totally independent of others, is that sound and wholesome doctrine received from Aristotle (though neglected in his logic), to exemplify and illustrate which is a main object of these Lectures; as it leads to the due distinction,

couragement to a cheerful and diligent study of nature. The causes employed are few and simple beyond expression; their effects are infinitely various and wonderful; and to those who begin upon a right foundation, they will unfold themselves every day more and more; nor will the labour of man be lost in the pursuit, till he has acquired as much knowledge of this sort as will do him good in his present state."—Jones's Philosophy, p. 225.

Upon the whole, both these authors agree with our great philosopher as to the who, the where, and the when. It is God, in all places, and at all times. But they differ as to the manner how. And though both may have supplanted the Newtonian forces, their hypotheses are opposite to each other, and each may serve to prove that the other is in the wrong. And however honourable the search, if conducted with humility and prudence, the physical causes of things may often be among those of "his ways which are past finding out." Whether he dispense his blessings through the world more immediately with his own hand, or through the mediation of second causes, the real government of the whole will terminate equally in himself. If, "in his

and facilitates the just apprehension of all the kinds of truth. Physical principles, whether general causes if they are to be found, or phenomena, which for philosophical purposes are equivalent to causes, are collected from experiments which are particular matters of fact, and cannot possibly originate in geometry, which consists in the speculation of general ideas; however useful geometry may be in the art of deducing them in the first place, and of applying them afterwards⁴¹.

wisdom he made the worlds," He upholds them by his power. If his sun replenish us with its light, and invigorate us with its heat, it is He "who maketh it to rise on the evil and on the good." If the air yield nourishment and respiration to the vegetable and animal creations, it is He "who giveth life and breath and all things." If the clouds pour down water to fertilize the earth, it is He "who sendeth his rain on the just and on the unjust;" He is both "alpha and omega," the beginning and the end, "in whom we live and move, and have our being."

⁴¹ Young mathematicians, who are smatterers in philosophy, are apt to form very high and preposterous ideas of the nature and perfection of physical science, betrayed probably into a mistake, in regard to its principles, by Sir Isaac Newton having called his Philosophy "*Principia Mathematica*:" and again by the following and similar expressions, "Hactenus principia tradidi a mathematicis recepta, et experientia multiplici confirmata."—Præf. ad Princip. From which it would seem, as if he considered mathematics as the subject matter, and experiments only as the instruments, which is directly contrary to the truth.

It is accordingly observed by a very able and ingenious philosopher, that “ geometry can be of little use till data are collected to build upon⁴².” These data are furnished by experiments and inductions, and lay the foundation of the philosophical superstructure, which mathematics sometimes lend most useful assistance in building up. If the foundation be well and firmly laid, the superstructure will be sound and strong; if otherwise, it will be infirm and weak: for, however sure and invincible mathematical reasoning may be, either considered in its pure state, or in its operation on true materials; when employed upon false and mistaken principles, it is as false and erroneous as any other that is also misapplied⁴³.

⁴² Maclaurin, p. 35.

⁴³ Geometriam atque arithmetiam, velut alas duas astronomiæ datas esse, scite quidem ac vere dixit Plato; suumque adjecit calculum Lansbergius. Atqui non solum alas habent volucres quibus in cœlum subvehantur, sed additur præterea cauda, quæ temonis instar, volatus earum regere possit. Simili omnino ratione, quamvis geometria et arithmetica astronomo summopere sint necessariæ, adeo ut illis nequaquam carere possit; per se tamen non sufficiunt ad laborem hunc Herculeum perficiendum, nisi insuper accedat ratio physica, quæ, tanquam Naucerus puppi insidens, totius speculationis clavum teneat. Si quis igitur Palladem

In their application to portions of natural philosophy, mathematics are therefore not to be considered as fundamental, but as instrumental only: and however mixed in operation, the judicious philosopher will distinguish the physical principles, whatever they may be or wherever found, from the mathematics operating upon them. The motion of bodies on the surface of the earth is the phenomenon, which from experiment supplies the physical principle; and geometry, by applying its mensurations to that motion, erects this part of natural philosophy

hanc, difficilis licet vultus, comitem et ducem nolit; nil mirum si, latentibus alicubi scopulis impingens, in erroris pelago naufragium fecerit. Atque hanc ego rationem existimo, quod tam diu formosissima illa divarum Urania tam difficilem petentibus præbuit aurem, quod scilicet hanc philosophiæ partem physicam a rebus astronomicis excludentes, mediatricem illam noluerunt. Exoranda est itaque summoque studio excolendai intima hæc astronomiæ famula, illis qui suavissimo Uraniaë gremio, votis tandem potiti, conquiescere desiderant. Quæ quidem ut mihi sit propitia, summis studiorum præmiis ac meritis contendam, ut mediante illius opera suavissimos dominæ suæ vultus perspiciam. Meos amores enim celare non possum, nec tamen æmulos metuo. Sponsam habeat illibatam illam virginem (Astrorum Scientiam) quicumque erit cui palmam ipsa concesserit, mihi sat erit, si vel tædam maritalem nuptiis suis præferre me dignabatur.—Horroccii Opera Posthuma, Disp. i. cap. 2.

into the science of mechanics. The similar motion of bodies in the heavens is the phenomenon established by observation, which whether the cause of that motion can be known or not, is the physical principle ; and geometry, by the application of similar mensurations, produces the science of astronomy : and the same might be observed of music in connexion with harmonics. All which departments of philosophy, by such application of mathematics, enjoy advantages different and superior to some other parts of physics.

Whoever therefore would hope for success in his philosophical researches, will not adapt physics to mathematics, but mathematics to physics, in obedience to the direction of the author of the *Novum Organum*, who hath observed, that “ all natural inquiries succeed the best, when a physical principle is made to terminate in a mathematical operation⁴⁴.”

And thus we have shown, according to the rule prescribed by Lord Bacon, the friend

⁴⁴ *Optime cedit inquisitio naturalis, quando physicum terminatur in mathematico.*—Bacon. *Nov. Org.* lib. iii.

and father of philosophers, and according to the practice of Sir Isaac Newton, who exemplified the precepts of his great master, that all reasoning in natural philosophy is ascendent and descendent—from experiments to axioms, and from axioms to new discoveries⁴⁵.

SECT. IV.

Of Physical Truth.

BUT since the best and most accurate experiments that are instituted and conducted by human skill, which are the basis and support of all sound philosophy, cannot penetrate into the real essence of things; since they can only inform the senses of some of their apparent qualities, and of secondary, which we call physical causes, and generally only of the phenomena or effects themselves;

⁴⁵ Neque enim in plano via sita est, sed ascendendo et descendendo; ascendendo primo ad axiomata, descendendo ad opera.—Bacon. Nov. Org. lib. i. aph. 104.

See De Augm. Scient. lib. iii. cap. 3.

since the induction, by which the general truths are collected from particular experiments is only partial and confined, and extended by analogy, which is an indirect species of reasoning, never absolutely conclusive ; since these general truths, which become the laws and principles of philosophy, do not possess the evidence of mathematical axioms ; and lastly, since from these principles, particular, not general, conclusions are deduced,—physical truth must consequently partake of the nature and inferiority of their principles and mode of reasoning¹. Though mathematics, by a friendly mixture and communication, often facilitate their production and elucidate their force, imparting to them, in all subjects capable of mensuration and where quantity can apply, the use and similarity of scientific demonstration ; however certain, they are not to be pronounced absolutely necessary ; and philosophically considered, they are in nature and

¹ Διόπερ φανερόν ὅτι οὐκ ἔστιν ἀπόδειξις οὐσίας, οὐδὲ τῆ τί ἐστίν ἐκ τῆς τοιαύτης ἐπαγωγῆς, ἀλλὰ τις ἄλλος τρόπος τῆς δηλώσεως.—Aristot. Metaph. lib. vi. cap. 1.

evidence greatly inferior to mathematical conclusions².

Still the philosophy of nature is the field of utility and beauty. It ministers to the wants, and supplies many of the ornaments of life. It opens one of the universal books of God, in which his infinite power, his stupendous wisdom, and unbounded goodness are written with his own finger in most fair and convincing characters; and thus the material world is made the counterpart of the immaterial mind, in which the latter contemplates as in a glass the image of its Author. Yet after all the improvements which have honoured the labours of Boyle, Newton, Halley and others, whose studies, since the great Bacon founded the true, that

² Zealous for the honour and perfection of their favourite study, some of our modern philosophers strenuously contend that almost every thing in physics is demonstrable. "The ground and reason of which," observes one of better information, "I apprehend to be, that many of our geometricians, ambitious of dictating to us about the causes and first springs of Nature, while they can reach only to the measure of some of its effects, have not been careful to distinguish how far a mathematical conclusion will extend, and how far not." —Jones's *Philosophy*, p. 91.

is, the inductive logic, have conferred upon this nation the laurel of philosophy ; so vast is its variety and extent, that our knowledge of nature is still very partial and imperfect. The more we know, the more we shall acknowledge to remain unknown, and the more readily subscribe to the verdict of that illustrious child of Wisdom who hath sublimely observed,—“ God hath planted the world in man’s heart, yet cannot man find out the work which he worketh from the beginning unto the end³.”

We are still only in the infancy of knowledge, and, though not in the sense in which the word was used by the old philosophers, many qualities and causes are yet *occult*, which may be brought to light by future experiment and analysis. New inductions may be instituted, new axioms established, and new inventions discovered ; and thus the great volume of nature is calculated, by the omniscience of its Author, to afford scope to this virtuous and honourable employment, till its whole system shall dissolve and vanish,

³ Eccles. iii. 11.

and be succeeded by another of superior order. And then there shall be “ a new heaven and a new earth,” in which the First will himself take place of all secondary causes ; when the film which is spread over the carnal eye shall be removed, new objects presented and new scenes disclosed, under the aspect and illumination of a brighter sun⁴.

⁴ Isaiah, lx. 19, 20 ; and Luke, xvii. 2.

On the general subject of this chapter, consult Herschel's Discourses on the Study of Natural Philosophy ; Playfair's Dissertations on the Progress of Mathematical and Physical Science ; Stewart's Philosophy of the Human Mind, vol. ii. chap. 4 ; his First Dissertation, chap. 2 ; Maclaurin's Account of Sir I. Newton's Discoveries, book iv. chap. 9 ; Reid's Essays, vol. ii. chap. 4 ; Browne's Lectures on the Philosophy of Mind ; Adam Smith's History of Astronomy ; Whewell's Bridgewater Treatise, &c.—*Editor*.

CHAP. III.

METAPHYSICS.

SECT. I.

The Logic of Metaphysics.

BOOTH Aristotle and Bacon agree in styling this “the Universal Science,” having universal being for its subject, but especially mind, the highest and most universal, in as much as it is the primary cause of nature, and as furnishing the principles of all other parts of learning. They likewise agree in terming it “the First Philosophy.”

But what is first to nature is not the first to man; nature (*i. e.* the God of nature) deals in universals, man deals with particulars, from which he ascends by progressive steps to generals, and from generals to universals. Thus the course of human study

is the inverse of the course of things in nature. In this study or cultivation of physics, we have seen, in the foregoing chapter, the philosopher has always to deal with particular facts, from which he rises to generals. This study of nature was, therefore, first in respect of man to the study of universals; and hence, as we have observed, the science of universals obtained the name of metaphysics, literally *μετὰ τὰ Φυσικά*, which sufficiently accounts for our present arrangement.

Metaphysical science, considered in its widest extent, is the science of the principles and cause of all things existing. But in its more confined and ordinary acceptation, it is the science of the human mind, as known to us by consciousness and reflection. The logic of metaphysics therefore consists in the study of the human faculties, by turning our thoughts inwardly upon our own mental operations, and then arranging them according to the phenomena which they exhibit; in analyzing faculties which are compounded into simple, and in tracing our mental operations. This logic is consequently based on the principle of induction with respect to

the phenomena of thought, in the same manner that the logic of physics is directed to the phenomena of external motion.

SECT. II.

Metaphysical Principles.

THE science of metaphysics presents itself to us with advantage as succeeding to that of physics or natural philosophy, because it has run nearly the same course in the history of the world ; so that the progress and history of the one, may serve to illustrate and exemplify the fortunes and history of the other.

With Aristotle and the ancient philosophers, they both laboured under the same fundamental defect, through the want of sound and solid principles for their legitimate investigation. Cultivated in the same school of factitious and assumptive logic, they began both at the wrong end. With them, general truths, *i. e.* propositions of their own supposition or invention, which they styled axioms, formed the basis of all science, instead

of beginning with particular facts, and ascending by a just induction to general principles. And thus the metaphysical axioms of the ancients were nothing better than gratuitous assumptions, instead of being the result of observations, accurately deduced from the actual motions and operations of the mind, through the medium of consciousness and self-reflection. Nor it is to be wondered that if their physical researches terminated in theories, which had little relation to the real laws of the external world, their researches into the regions of mind should have been still more distinguished by baseless fancies and chimeras.

From the false principles on which this science has so long been cultivated, it has become the theme of ridicule with many sensible men, and from the nature of the abstract subjects on which it treats, many philosophers have deemed it too abstruse and barren to reward their labours. Some good men, from the vast range of its subjects, and the depth and sublimity of its researches, have denounced its study altogether, as dangerous, vain, and presumptuous.

But, when brought down from the flights of imagination to the calm and sober study of our own faculties, what is more worthy of man than the mind of man? When built on the sound principles of observation and experience, no study can be more productive of utility and honour to the philosophical inquirer. But it should be pursued strictly on the rules of the Baconian logic—"Homo naturæ minister et interpres tantum facit et intelligit, quantum de ordine naturæ opere, vel *mente* observaverit; nec amplius scit, aut potest."

What then are its genuine principles, and what is the legitimate course of its study? The mind, though invisible, is known to us by its operations, as distinctly as external objects are known to our outward senses. Our consciousness is ever present, and by turning itself on its own axis can become the spectator and reviewer of all our mental operations, just as things hard or soft, rough or smooth, are known to the touch, or the beautiful tints of the rainbow are recognised by the eye.

Hence by an obvious analogy, as external

sense is the primary principle of all physical knowledge, so consciousness, or the internal sense, is the primary principle of all metaphysical science. This internal sense is keen, penetrating, and acute, and becomes wonderfully strengthened by thus concentrating its attention on the surrounding faculties. As the external senses discover the various qualities and affections of body, this interior sense discovers the various acts and operations of mind, and when in a sound and healthy state, it reports mental facts and phenomena with sufficient truth and accuracy, for all the purposes of human knowledge¹.

¹ On the general subject of metaphysical science, consult the works of Locke, Reid, Stewart, and Browne—Hobbes, Berkeley, Baxter (Andrew), and Hume with some caution and reserve. For the establishment of sound first principles, the Editor would recommend the works of Dr. Reid as superior to those of every metaphysical writer, ancient or modern, with which he is acquainted.

SECT. III.

Metaphysical Reasoning.

ACCORDING to our foregoing observations, reason begins her operations in this science, as in physics, with particulars; but here, internal sense, or consciousness, is the primary principle. By frequent observations on the acts and motions of the human mind, closely and accurately pursued, reason, on comparing them with each other, can distinguish their difference or agreement, and thus arrange them into their several orders or classes. And by frequent repetition of the same analytical process, reason can form the lower classes into more general classes. By this analysis, she can also discriminate one operation of mind from another, and attribute them to separate and distinct faculties,—the intellect, the will, and the imagination. She can observe the laws of association, the connexions of one faculty with another, and the general union and harmony of all.

The secondary materials for this reasoning is the history of the human mind, as recorded by others, describing numerous and authentic phenomena; but these should always be tested by ourselves, and submitted, as far as possible, to our individual scrutiny.

A fallacious estimate of the powers and capacities of the human mind, particularly that she enters on this stage of life furnished with innate ideas and principles, by which she is enabled to carry on her inquiries after truth to an unbounded extent, was the fundamental error which formerly prevailed, and which long prevented any real advance in the science of metaphysic. It was the honour of Mr. Locke to refute this absurd and most pernicious theory. (See his *Essay*, vol. i. book i. chap. 2, 3, 4.) But, in the pursuit of this error, he has been led into the contrary extreme, by referring all our original ideas to the sole principle of sensation. By principles, Mr. Locke denotes general truths, which we have called *secondary* principles, to distinguish them from the sources from which they are derived, which we have denominated *primary* principles.

Of these sources of knowledge, Mr. Locke allows but one, external sense, seconded by reflection—whereas we contend also for another, internal sense, or consciousness, which may also be aided by reflection. It is this difference which constitutes the great distinction between Mr. Locke and myself in our metaphysical inquiries, and herein I have the honour to be supported by Dr. Reid and his followers.

Whether such principles were considered as innate or acquired by Aristotle and his disciples, they were always gratuitously assumed, and not inductively formed by experience and observation. Hence the whole science of metaphysics continued for ages to rest on mere hypothesis and vague speculation. Nor was it, till Locke performed for this science the part of Bacon, that it could properly be said to rest on scientific principles. The same injury which had been inflicted on physics by gratuitous axioms, was inflicted on metaphysics by the doctrine of innate ideas.

And thus in this, as well as in the physical departments of learning, we have been

brought out of the false, into the true method of philosophising, by the patient efforts of induction and experience. We have witnessed with astonishment the brilliant discoveries which science has made in physics, by leaving the dreams of Aristotle, and confining its attention to the known qualities and phenomena of body. By a patient attention to the acts, and a sober investigation of the faculties and phenomena of mind, we may hereafter anticipate corresponding success in the study of metaphysics.

The process of reason is here therefore strictly inductive, and when by this process, secondary principles or general truths are established, little if any advantage can be derived from the use of syllogism.

As it is not the intention of this work, to descend to the discussion of the particular topics belonging to different sciences, but merely to delineate the general field of each, and to show how each may be cultivated with success, I shall forbear any further observations, with a single remark. I have often wished that this queen of science would

adopt a language of her own, peculiar and appropriate to herself. This is the prerogative and glory of the mathematics. Many of the arts and sciences have also a specific phraseology, at least for their official terms. If this science had a specific language, with terms so numerous and appropriate, that one need never be used for another, and so defined and determinate, that it might be clearly and distinctly understood, it would greatly contribute to its success. For want of such an expedient, it is to be feared that much doubt and difficulty will long attend these abstract researches¹.

¹ On the subject of this chapter, consult Locke, book iii.; Reid's Essays, vol. ii. Essay 5; Stewart's Elements, vol. i. chap. 3, vol. ii. chap. 4; Browne's Lectures, 11, &c.; Adam Smith's Sketches of the History of Ancient Logics and Metaphysics, &c.—*Editor*.

SECT. IV.

Metaphysical Truth.

THE species of truth, which results from the philosophy of mind, must itself relate immediately to mind, and must consist in placing before us a faithful and exact delineation of our intellectual and moral faculties. The mind of man is found on investigation to be a complex machine, composed of various energies, and it is the business of this first philosophy to distinguish these energies from each other, and then to distinguish the truth which is appropriate to each. But this truth cannot be discovered without an insight into their several principles. Its business, therefore, should be to establish, as science, the principles of that truth which belongs to each faculty. Hence it is justly styled the *first philosophy*, because these principles relate to all kinds of knowledge. It is the parent, the mother of them all.

To investigate these different principles in

their relation to the respective faculties and departments of the human mind—the understanding (of which memory is part), the will, and the imagination; to point out the supremacy of conscience, as the judge and assessor of our moral conduct; to elucidate the effects of our associations of ideas; to ascertain the right method of reasoning belonging to every science, and to distinguish the kinds of truth resulting from each, with their various degrees and modes of assent—this is the business of that general logic which is the subject of my present undertaking. But truth, in its relation to the proper use and exercises of the mind, is that which more peculiarly belongs to metaphysics—whence it conducts the faculties, duly disciplined and instructed, into the enjoyment of universal truth¹.

¹ Consult Reid's *Inquiry into the Human Mind*, chap. i.; Browne's *First Lecture on the Philosophy of the Human Mind*; Stewart's *Elements*, vol. i. part 1 and 2, &c.—*Editor*.

CHAP. IV.

FACTS.

SECT. I.

The Logic of Facts.

FROM physics, the plan chalked out for the arrangement and execution of this general Chart of Truth leads us to that extensive department comprehending all those transactions, occurrences, and events which are known by the name of facts, as belonging to the same theoretic¹ province of mind, and entitled to the same distinction from subjects whether of practical² or poetical design.

¹ Τῆς δὲ θεωρητικῆς διανοίας, καὶ μὴ πρακτικῆς, μηδὲ ποιητικῆς, τὸ εὖ καὶ κακῶς, τ'αληθές ἐστι καὶ ψευδός.—Aristot. Ethic. Nicom. lib. vi. cap. 2.

² Οὐκ ἔστι δὲ προαιρετὸν ἄθρον γεγονότος, οἷον ἄθεις προαιρεῖται Ἰλιον πεπορθκέναι. ἔδὲ γὰρ βηλεύεται περὶ τῷ γεγονότος,

This is a kind of truth, which is so direct and obvious in its nature, so open to the apprehension, and so familiar to the mind of all men, that it seems to have escaped philosophical inquiry and critical examination. As it is, however, a species of truth of more universal extent than any other, and of more immediate importance in every stage and sphere of life; and especially, since by the decree of Providence it has been made a principal foundation of those supreme and sublime truths, which are the main object of this analysis, it demands, in this place, a logical consideration³.

ἀλλὰ περὶ τῆ ἐσομένης, καὶ ἐνδεχομένης. τὸ δὲ γεγονὸς ἔκ ἐνδέ-
χεται μὴ γενέσθαι. διὸ ὀρθῶς Ἀγάθων,

Μόνος γὰρ αὐτῆ καὶ θεὸς περιίσκεται,
Ἀγένητα ποιεῖν ἄσπ' ἂν ἧ πεπραγμένα.

—Ibid.

³ On the evidence of facts, as regards our external senses, the reader should study the original and profound “ Inquiry ” of Dr. Reid. Also Campbell’s Dissertation on Miracles.—*Editor*.

SECT. II.

The Principle of Facts.

FACTS have a most intimate and inseparable connexion with physical science. As truths, they derive their existence from the same first principle, the notices and indications of the external senses; and had it not been for their close connexion with the subject of the succeeding chapter, they would have been entitled to the precedence in this logical arrangement, as they supply the foundation of all physical deductions; for without experiments, which are a species of facts, there can be no sound philosophy of nature.

But whereas physics quit the first impressions made upon the senses by individual objects, and from phenomena and effects by the aid of experiment descend to the investigation of qualities and causes, in order to form general laws for the proof of particular

truths¹, which are permanent, and will extend to all times and places so long as nature remains the same; facts, as truths, result immediately from the individual objects presented to the senses, from the phenomena and effects themselves, and though certain, are transient, and confined within the limits of time and place.

They are all particular independent truths, not deriving their proof from generals, as those of physics; but requiring for their confirmation, that a particular event, or series of events should occur to the ocular notice of a person or persons at a certain time and place; that a particular phenomenon appeared; or that a particular thing was heard, or seen, to be said or done. Thus for the proof of facts, the coincidence of a particular transaction, person, time, or place is absolutely required; and the evidence of the external senses of those who

¹ *Philosophia individua dimittit, neque impressiones primas individuorum, sed notiones ab illis abstractas complectitur; atque in iis componendis et dividendis, ex lege naturæ et rerum ipsarum evidentia, versatur. Atque hoc prorsus officium est atque opificium rationis. Bacon. De Augm. Scient. lib. ii. cap. 1.*

were the immediate witnesses is the first and last credential.

—That on Friday the 13th day of March 1789, the university and city of Oxford expressed their loyalty and affection to our amiable and illustrious sovereign, the father of his country, and the friend of all men, and testified a universal and unbounded joy for his recovery from a long and dangerous sickness, and his resumption of the throne of these kingdoms, by a general illumination,—this is a fact of which we, who were present, were rejoiced to be convinced ; and of which conviction the evidence of sight, the most familiar of the senses, was the adequate and sufficient cause.—Here was a full coincidence of all the particulars which are requisite to evince and establish the truth of facts.

SECT. III.

Of Reasoning on Facts.

FAR from being the consequences or conclusions of any process of reason, facts result immediately from the senses. They convince the mind, without its considering or attending to their physical or other causes, and become themselves, as first principles of reasoning.

As truths, each of them stands on its separate and independent basis, terminating and concluding in itself; so that all direct comparisons and judgments between one fact and another, or between a fact and any other thing, is irrelevant to their truth, and consequently all inductive reasoning is excluded. For moral and political purposes they are often indeed generalized and arranged in classes; but as truths, they want no general propositions from which they are to be deduced as consequences; and as they admit of no secondary principle, all reason-

ing by syllogism or superinduction is of course totally superseded.

But though reason has no proper or direct concern with facts from their high privilege as first principles, it is never better or more essentially employed, than when it examines and inquires respecting them. The method which it pursues may indeed be very different from those we have been tracing whether in mathematics or physics (for give it fair play, and reason will, some way or other, adapt itself to every thing); it is not, however, to be rejected or discarded here. This useful office it performs, by examining whether the external senses, the first and final evidence of facts, are in a sound and healthy state; whether they are well and sufficiently informed; and whether they are subject to any impediment from nature, imposition from art, or fallacy from accident. In this exercise, she does not presume to change or to correct the verdict of the senses, by any preconceived notion or factitious determination of her own. Sensible of the supreme dignity and exclusive privi-

lege of first principles, she forbears to compare them with any thing else, or to judge of them by any medium but themselves. All that she presumes, is by indirect and collateral comparisons, to rectify and ascertain the evidence of sense by the evidence of sense; that is, to judge of it by its own verdict.

Thus, if on viewing any object with care and circumspection, what appears to our eye, appears the same to others, who see it at the same time and place; or if what appears to our eye at a certain time and place, has uniformly appeared the same at all other times and places; we conclude, from these comparisons and judgments, (which is an indirect mode of reasoning and a species of analogy) that the sense is sufficiently perfect and well-informed. And what contributes both to facilitate and ensure the conclusion is this—that facts are truths in which we are bred and conversant from infancy; that hourly experience in ourselves, confirmed by the express, and perhaps still more by the tacit acknowledgment of the same in others, would imme-

diately detect and expose any impediment, deception, or fallacy in the senses, and thus effectually secure the judgment from mistake or error.

And this we call a species of reasoning, because, as Dr. Reid justly observes, “The senses are all limited and imperfect, and that we are liable to error and wrong judgment in the use of all.” They are “to be corrected by more accurate attention to their informations,” by comparing and judging of this more accurate intelligence; but wherever there is comparison and judgment there is, according to our enlarged idea of reasoning, some act of reason.

The mode in which philosophers, ancient and modern, have affected to correct the senses by reason, is very different. They pretend to judge of the evidence of the senses by some subtle notions of their own invention; which is to judge of a first principle of reasoning by no principle in nature. This is the error in the use of reason so justly condemned by Dr. Reid, *Essay* ii. chap. 22.

SECT. IV.

The Truth of Facts.

THOUGH derived from the same first principle of knowledge with mathematical and physical truth, that of facts, logically viewed, is essentially different both from the demonstrations of the one, and the deductions of the other. It differs from them, as well in its nature and constitution, as in the mode of reasoning employed.

This species of truth enjoys the peculiar and exclusive privilege of being both intuitive and self-evident. As soon as presented, it is palpably and irresistibly felt at once; and it is so immediate, that it flashes conviction upon the mind through the medium of the senses, when sound and well-informed, without an act of direct comparison. It is so strong and invincible in operation, that it defeats the powers of judgment. Thus fact and truth, in common and vernacular language, are synonymous words; and the

strength of its evidence cannot be more forcibly or pointedly expressed, than by the vulgar phrase—"Seeing is believing."

As these truths are not only the most numerous, plain, and common of all others, but of the most interesting and personal concern to men; in condescension to their feelings and necessities, Providence hath made them the most obvious, easy, and familiar to the apprehension of all. By their frequency and incessant occurrence in the routine of human affairs, however various and multiplex they may be, they are equally obvious and familiar in their proximate and efficient causes.

From these singular and superior advantages by which facts are distinguished, in the general scale of truth, above every other kind, they have been singularly honoured, as will be shown in the sequel of this work, in their use and application, by the Author and Finisher of all truth.

CHAP. V.

HISTORY.

SECT. I.

The Logic of History.

THOSE important and interesting truths comprehended under the general name of facts, which determine the fortune of individuals, involve the welfare of societies, on which depend the fate of nations, and which fill all the busy and variegated scenes of life, are incessantly and unexpectedly turning up in the tide of things, and again as incessantly and irrecoverably buried in its vortex. They are by nature transient and irrevocable, confined and circumscribed within the strictest limits of time and place. So likewise from the constitution of humanity are the persons of men. In all cases, therefore, in which these do not hap-

pen to coincide with them both in time and place, this species of truth, taken in its widest comprehension, including characters and events as well as acts, cannot be personally and directly known.

This great chasm and defect, by which our personal intercourse is cut off from the largest and most valuable part of this useful and interesting knowledge, is filled and supplied by history,—that elegant retrospective mirror, which by its reflection opens to us a view into ages never to return, which gives facts an enlargement and extension to all times and places, and thus becomes the guide and instructor of human life¹.

¹ *Historia, testis temporum, lux veritatis, vita memoriæ, magistra vitæ, nuncia veritatis.*—Cic. de Orat. lib. ii. cap. 36.

SECT. II.

The Historical Principle.

ALL the actions, characters, and events which have existed, or do exist, in times or places, when and where we either did or could not witness them ourselves, if ever we may know them, (and these form the greatest proportion of our knowledge), it must be from the narration or testimony, that is, the authority of others. By narration, I mean to express the communication of facts, with which we are coincident in point of time, but not of place. Testimony, I apply, to the communication of those with which we are coincident neither in time nor place. These two are the necessary and indispensable vehicles of historical truth.

—That on Tuesday the 10th day of March 1789, the cities of London and Westminster exhibited similar tokens of their love and loyalty to their king, by a general illumination on the same joyful occasion above-

mentioned¹, is a fact of which we, who were not there, rejoiced to hear ; of the truth of which we are as fully and certainly, though not so directly convinced, on the narration of others public and private, as we were of that which on the 13th we witnessed ourselves at Oxford. In the case of this fact, there was a coincidence of person and transaction in point of time, but not of place.

And both of these facts will be transmitted, as they deserve, to future ages, and received by them with almost the same degree of certainty, on the authority of sound and well authenticated testimony ; in which case, all coincidence of person, transaction, time, and place must be removed.

All historical facts, as truths, derive their existence from narration and testimony, which are therefore to be regarded as their principles, agreeing in one, which is the main point of consideration—that they are both founded on the information and authority of others : and, as the short space of

¹ P. 197 *supra*.

man's life, to which narration has a reference, bears so small a proportion to the extent of time within the reach of human tradition and record, testimony may be used, as it often is, to express the whole,—the general principle of all historical truth.

SECT. III.

Historical Reasoning.

AS in all parts of knowledge in which general principles are concerned, so in historical reasoning, we argue first to the principle, and thence downwards from the principle.

How then is the credit and authority of testimony, on which all history depends, established and confirmed?

Historical facts are all particular and individual in their existence; and by their nature removed from the evidence of the external senses; and as all general principles are formed by an induction of particulars, there must be some other native

evidence as a first principle, by which a number of these particular facts are estimated and their truth confirmed, sufficient to ensure the authority and warrant the general truth of the secondary principle of testimony.

The senses are doubtless the first informers, but memory is the register and storehouse of the mind, in which all the facts which they have witnessed, and all the truths which are otherwise obtained, are lodged and recorded with as much fidelity as is consistent with the condition of imperfect creatures. So far as relates to its retention, communication, and tradition, it is recognised and acknowledged as a first principle of truth. It is accordingly recognised by Lord Bacon, as that important department of the intellect to which history peculiarly belongs.

The memory of man does not profess to be infallible. It is subject to similar infirmities and defects with those of the external senses ; and capable of being regulated and adjusted, by an act of reason, in a similar manner. After comparing it with its own exertions at

different times and in different instances, and after examining whether, in the instance under consideration, it is uniform and consistent with its other acts, reason confirms its fidelity so far established, and ensures it still further, by comparing it with other memories acting collaterally with it in the same instance. And here we may remark, that this department of mind has its different species and varieties. It is a fruitful field, but less cultivated by metaphysicians than almost any other, and as such we may earnestly commend it to their future attention.

But memory, however faithful it may be found, is not sufficient of itself to establish and erect testimony into a general principle of reasoning, since what it records is liable to be betrayed, disguised, or falsified in the act of utterance. It requires to be guarded and secured by another native and powerful dictate of the mind, the love of truth, which, as a collateral principle, comes in to the aid and support of memory.

Convinced of the existence of both these principles from our own consciousness and

internal feeling, presuming that all men formed of the same materials are cast in the same mould, and observing them to operate in the minds of all to whom that observation can extend ; we conclude, by a strong analogy and induction, that they are universal. And we are convinced from an experience that does honour to human nature, that whenever interest, or any other evil and sinister motive, influences an individual or combination of men to counteract these native dictates, to reject the truth and espouse and propagate a lie ; the lie is detested and contradicted as soon as found, and the truth is justified, vindicated, and avenged by the public voice. That truth, in opposition to the lie, strengthened and supported by self-approbation and the native sense of right in its assertor, will be sure to prevail at last. Nay, it is experimentally known, that when facts are duly attested by persons who are competent judges and of sufficient credit, men must and do believe them, and that they find it impossible to withhold their assent.

Upon the ground of these two first prin-

principles, the one a native faculty, and the other a sublime affection of the mind, operating in conjunction, the credit of all history is originally founded. From the particular instances which are innumerable and incessantly occur, in which they are observed to act together in strict and faithful union, we derive, by a familiar and almost insensible induction, the authority and truth of testimony. This, as it is not only the general vehicle or channel of all historical facts of whatever kind, but the universal fountain from which they flow, has a right to be classed among the secondary principles of truth. Testimony is indeed of such great variety and extent, and of such frequent occurrence and vast importance in all the business and affairs of life, that (as is common in the use of many words), from the frequency of its application, it has appropriated to itself the name of *evidence*, which is a general term, equally applicable to the principles of other kinds of truth with historical.

This general principle is, however, very

different in its nature and constitution from mathematical, physical, and other axioms, as it is of much larger operation and extent ; and accordingly the method of reasoning from testimony, in all particular instances, is very different.

Axioms, logically speaking, are the sources of truth, producing it in the minds of all who can apply them in reasoning ; without respect to persons, times, or place. They are, therefore, general laws possessed of a certain standard, which is fixed and determined in itself, by which they impart the same degree of certainty and conviction in all the cases to which they are applied, namely, that which they themselves possess. Testimony, on the other hand, is not properly the source of truth ; it is only the medium, however indispensable, through which truths, already deduced from other causes are conveyed from one mind to another. It is only the channel by which actual truths are converted into historical. This channel or instrument has an immediate connexion with and dependency on particular persons, times, and places, by which their power and opera-

tion are perpetually varied, become stronger or weaker, more contracted or more enlarged. It is not, therefore, a general law possessing one common rule or standard, by which is imparted in all cases the same degree of certainty and conviction.

Historical learning is consequently the reverse of philosophical. Philosophy consists in tracing generals, history in pursuing particulars. The testimony on which it is founded varies with the circumstances, in each particular instance to which it is applied¹. Historical reasoning does not conclude by reducing particulars under general propositions by syllogism or superinduction. It has a more tedious and laborious process. It descends to the investigation of every particular historical fact through all the windings of testimony, either by tracing it up to its proper time, place, and the persons of its primitive witnesses; or by bringing it down from thence. It consists in a minute examination of particular witnesses, in a candid estimate of collateral proofs, and in

¹ *Historia proprie individuorum est, quæ circumscribuntur loco et tempore.*—Bacon. *De Augm. Scient.* lib. ii. cap. 1.

a conclusion formed upon a full induction and fair valuation of the whole².

The knowledge which we derive through the channel of history is consequently more various and extensive, more interesting and important, than perhaps the whole stock of our other information. The investigation of historical facts, which must be conducted by a particular and separate process, constitutes a very large proportion of the most useful labours and valuable collections of learned men. History involves in its composition many different and distinct objects, and has many different ends in view. In the execution, it receives from the pen of the historian many graces and embellishments, and from the interest which man always takes in the concerns of man, it be-

² Probability wanting that intuitive evidence which infallibly determines the understanding, and produces certain knowledge, the mind, if it would proceed rationally, ought to examine all the grounds of probability, and see how they make more or less for or against any proposition, before it assents to or dissents from it, and, upon a due balancing the whole, reject or receive it, with a more or less firm assent, proportionably to the preponderancy of the greater grounds of probability on one side or the other.—Locke, *Hum. Und.* book iv. chap. 15, sect. 5.

comes a species of writing the most instructive to the mind, and the most pleasing to the imagination. Divested, however, of these adventitious considerations, and logically viewed, it is the investigation of facts through the channel of testimony. It is the general rule by which this investigation is conducted, in bringing them down from the time of their actual existence ;—First, to inquire whether the senses of the primitive witnesses were duly informed of the facts related, and they themselves competent to judge of them. Secondly, to examine whether these witnesses were honest and faithful relaters of these facts to others. Thirdly, as testimony, from the nature and necessity of things, is often committed to written record, to trace the purity and authenticity of that record through all the persons, times, and places, through which it has descended, and lastly, to strengthen and corroborate the whole conclusion, by the examination and adduction of collateral testimonies³.—In this work of various learning, extensive

³ In the testimony of others is to be considered, 1. The number, 2. The integrity, 3. The skill of the witnesses. 4. The design of the author, where it is a testimony out of a

inquiry, and attentive investigation, reason will, I fear, derive little help from mood and figure⁴. There is here accordingly very slight occupation for syllogism.

SECT. IV.

Of Historical Truth.

HISTORICAL truth derived from the principle of testimony, so different in its nature from all others, and by a method of reasoning which is peculiar to itself, differs

book cited. 5. The consistency of the parts and circumstances of the relation. 6. Contrary testimonies.—Locke Hum. Und. book iv. chap. 15, sect. 4.

⁴ But, however it be in knowledge, I think I may truly say, it is of far less, or no use at all in probabilities. For the assent there being to be determined by the preponderancy, after a due weighing of all the proofs, with all circumstances on both sides, nothing is so unfit to assist the mind in that, as syllogism; which running away with one assumed probability, or one topical argument, pursues that, till it has led the mind quite out of sight of the thing under consideration; and, forcing it upon some remote difficulty, holds it fast there, entangled, perhaps, and as it were manacled, in the chain of syllogisms, without allowing it the liberty, much less affording it the helps, requisite to show on which side, all things considered, is the greater probability.—Ibid. book iv. chap. 17, sect. 5.

also from those which have been the subject of our previous discussion, in its operation and effect upon the understanding.

However certain and convincing it may be, when possessed of its greatest strength, it is indirect and secondary, amounting only to the highest summit of probability. As the testimony on which it depends, is in all cases particularly circumstanced and to be separately investigated, though all historical truth be of the same species, it will vary with these circumstances,—with the fidelity and success of the investigation, or with the clearness or obscurity of the media through which it comes,—almost from the verge of absolute certainty, through all the degrees of probability, down to the faintest shade of uncertainty and doubt. The assent with which the mind embraces it, in all the degrees and shades which it assumes, is called *belief*, which is stronger or weaker in its impression, in proportion to itself.

As it is only an enlargement of facts, and those other truths which have been previously considered, lengthened out and conveyed to us by testimony, it may be ranked under the

same common province. Being, however, more general in its operation, more frequent and familiar in its use, though inferior in force, it has, in common language, appropriated to itself the name of *truth*, as opposed to falsehood ; just as the testimony, on which it is founded, has obtained the name of *evidence*.

But however different and inferior it may be, historical truth is that on which the mind of man with a peculiar satisfaction delights to dwell. It hath therefore pleased that gracious Providence, which benignly consults the feelings of humanity in the promotion of our good, to render it of the most interesting and important concern to men. It holds out some of the principal lights, by which we are obliged, from the condition of our nature, to steer our way through the present dark and mysterious scene, in which we are only allowed to walk as by the glimmering of a distant twilight, and “to see and to know in part.” It is thus the knowledge of the past becomes connected with our present and future welfare.

CHAP. VI.

ETHICS.

SECT. I.

The Logic of Ethics.

LEAVING the theoretic division of this general chart, we now enter upon the practic, which is under the government and direction of the will—in other words, it is mind employed in moral action¹.

Aristotle has divided the whole field of knowledge into three grand provinces; and the line of distinction which he has drawn as the general confine between that of the rational theoretic mind, and those both of the practic and poetic, is this—that the first is productive of necessary, and the other two of contingent truth².

¹ Διάνοια πρακτικῆ.—See p. 22.

² Ὑποκείσθω δύο τὰ λόγον ἔχοντα· ἐν μὲν ᾧ θεωρῶμεν τὰ τοιαῦτα τῶν ὄντων, ὧν αἱ ἀρχαὶ μὴ ἐνδέχονται ἄλλως ἔχειν, ἐν

Thus truth is the staple produce, and reason the common instrument of all.—But he descends to a more particular and philosophical distinction of the three provinces, according to the different nature and direction which truth assumes in each³. In the theoretic province, he represents it as originating with its subject⁴, as standing in-

δέ γε ᾗ τὰ ἐνδεχόμενα. And he further distinguishes them by calling the first ἐπιστημονικόν, and that of the other two λογιστικόν.—Aristot. Ethic. Nicom. lib. vi. cap. 1.

Ὁρθῶς δὲ ἔχει καὶ τὸ καλέσαι τὴν φιλοσοφίαν ἐπισημνῆν τῆς ἀληθείας· θεωρητικῆς μὲν γὰρ τέλος ἀλήθεια, πρακτικῆς δὲ ἔργον, καὶ γὰρ εἰάν τὸ, πῶς ἔχει, σκοπῶσι, οὐ τὸ αἴτιον καθ' αὐτὸ, ἀλλὰ πρὸς τὸ, καὶ νῦν θεωροῦσιν οἱ πρακτικοί.—Aristot. Metaph. lib. ii. cap. 1.

Etiamsi activa scientia etiam veritatem rerum agendarum considerat, tamen a contemplativa duobus modis differt. Primum enim contemplativa veritatem per se considerat ut ultimum finem: activa autem veritatem per accidens considerat quatenus accidit rebus agendis, ut etiam cognosci queant et veritatem in sese habeant. Deinde contemplativa scientia veritatem considerat sempiternam, quæ semper et omni tempore est veritas: activa autem veritatem considerat secundum relationem, et tempus præsens atque certum, relatione cæterarum circumstantiarum quæ in actione considerandæ sunt, ubi aliquando quiddam verum et bonum esse potest, alio autem tempore verum et bonum propter circumstantias non est.—Joannes Ludov. Haven.

³ Ἀμφοτέρων δὴ τῶν νοητικῶν μορίων ἀλήθεια τὸ ἔργον.—Aristot. Ethic. Nicom. lib. vi. cap. 2.

⁴ Ἐν ᾗ ἡ ἀρχὴ τῆς κινήσεως καὶ πάσεως, ἐν αὐτῇ δῆλον ὅτι οὔτε πρακτικὴ ἐστὶν οὔτε ποιητικὴ.—Aristot. Metaph. lib. vi. cap. 1.

dependent, and terminating in itself⁵. In the practic, it originates in the mind of the agent⁶, joins itself to correct desire with which it mixes and cooperates⁷, and keeps in prospect a moral end beyond itself. In the poetic, it originates more in the inventive mind⁸ of the artist, and through the instrumentality of different means, intends and accomplishes a still farther end⁹, which is properly termed effect.

This distinction of the Peripatetic, how-

⁵ Τῆς δὲ θεωρητικῆς διανοίας, καὶ μὴ πρακτικῆς, μηδὲ ποιητικῆς, τὸ εὔ καὶ κακῶς, τάληθές ἐστι καὶ ψεῦδος· τῷτο γὰρ ἐστι παντὸς διανοητικῆ ἔργον.—Aristot. Ethic. Nicom. lib. vi. cap. 2.

⁶ Τῶν δὲ πρακτικῶν, ἐν τῷ πρώτῳ πρῶτοντι ἢ προαίρεσις· τὸ αὐτὸ γὰρ τὸ πρακτὸν καὶ προαιρετόν.—Aristot. Metaph. lib. vi. cap. 1.

⁷ Τοῦ δὲ πρακτικοῦ καὶ διανοητικῆ, ἡ ἀλήθεια ὁμολόγως ἔχουσα τῇ ὀρέξει τῇ ὀρθῇ· πράξεως μὲν ἔν ἀρχῇ, προαίρεσις, ὅθεν ἡ κίνησις, ἀλλ' ἔχ ἔνεκα· προαιρέσεως δὲ, ὄρεξις καὶ λόγος ὁ ἔνεκά τινος· διὸ οὐτ' ἄνευ νῆ καὶ διανοίας, ἢτ' ἄνευ ἡθικῆς ἐσιν ἔξεως ἢ προαίρεσις. εὐπραξία γὰρ καὶ τὸ ἐναντίον ἐν πράξει ἄνευ διανοίας καὶ ἡθους ἔκ ἐστι. διάνοια δ' αὐτῇ ἔθδεν κινεῖ, ἀλλ' ἢ ἔνεκά τῆ, καὶ πρακτικῆ.—Aristot. Ethic. Nicom. lib. vi. cap. 2.

⁸ Τῶν μὲν γὰρ ποιητικῶν ἐν τῷ ποιῶνται ἢ ἀρχῇ, ἢ νους ἐσιν, ἢ τέχνη, ἢ δύναμις τις.—Aristot. Metaph. lib. vi. cap. 1.

⁹ Αὕτη γὰρ καὶ τῆς ποιητικῆς ἀρχεῖ. ἔνεκα γὰρ τῆ ποιεῖ πᾶς ὁ ποιῶν· καὶ οὐ τέλος ἀπλῶς, ἀλλὰ πρὸς τι, καὶ τινὸς τὸ ποιητόν, ἀλλ' οὐ τὸ πρακτόν· ἢ γὰρ εὐπραξία τέλος, ἢ δ' ὄρεξις, τούτου.—Aristot. Ethic. Nicom. lib. vi. cap. 2.

ever philosophical, may be in some respects too metaphysical and refined. As all the parts of knowledge, which do not belong to the practic and poetic provinces, must, according to this division, be included in the theoretic, he has not made the outline of that sufficiently comprehensive. The object of theoretical learning is not confined to mere speculative truth, which terminates in itself alone. It extends, as we have seen, to the nature and properties of external things, and takes account of what is done and doing in the world, as truths adapted to all the uses and purposes of life; whilst the object of practical learning is the knowledge of good and evil, with a view to the right and responsible conduct of life. The end of the former is utility; the end of the latter is happiness.

But before we advance to this practical department, as the subject of rational investigation and productive of truth terminating in moral action, another distinction or subdivision must be drawn. No part of learning has been more involved and com-

plicated, in consequence of the vague and indefinite mode in which it has been treated, than moral philosophy; whence much obscurity and confusion have been brought into that most interesting and extensive science.

Before men can act in a moral capacity, they must first know how to act. Thus the ethical province, taken in its full extent, consists of two parts—the knowledge, and the practice; which, however inseparable they may be in the production of moral virtue, are distinct considerations in the eye of science and philosophy. It is with this knowledge, as a species of truth deducible from principles and propositions by an act of reason, or what moralists have been pleased to call practical intellect, independently of the action, that its logic is properly concerned¹⁰; and it is this part of ethics to which the present chapter is confined. But this specific truth, resulting from right reason, and forming the basis of mo-

¹⁰ *Nulla potestas aut imperium in voluntatem tribui debet intellectui; cujus quippe munus solum est bonum atque verum cernere, deque eo judicare.*

rality, is like all other speculative truth dead and inactive, till it be invigorated and enlivened into action by the motions and affections of the will¹¹, from which it is denominated *practical* truth, and arranged under that department of mind. Here therefore the other field of ethical cultivation opens to our view, which consists in influencing that will; in exciting and stimulating it to virtuous actions on the one hand, and in soothing and restraining it from vicious actions on the other. This part of morality consists rather in persuasion than conviction, and is properly the rhetoric of ethics. It must, however, be acknowledged as the crown and glory of the science; as a philosophy which confers the highest honour on human nature. It descends to the first springs and movements of the heart. It penetrates the inmost recesses of the mind. It both subdues and animates the passions, and regulates all the motions and affections of the will, by holding out to it the incentives of hope and fear. Its labour is various and

¹¹ Velle autem eligere, aut imperare solius voluntatis est.
—Lang. Ethic. p. 13.

extensive. It attends to every character and disposition. It consults the particular inclinations and seconds the natural propensities of men. And by the application of every expedient which reason and prudence can suggest, it nourishes the seeds of virtue into habits, and subdues and extirpates those of vice. Its office however is not less difficult than honourable, and has been more superficially attempted than successfully performed.

Thus moral virtue is a compound of two ingredients—right reason and well-directed appetite, which blend and incorporate together¹²: and when ethical truth is, by a virtuous determination of the will, reduced to its just and proper action; when it is employed to regulate the practice, to form the habits, to influence the morals and purify the lives of men, it flows in all the channels

¹² *Ἐστὶ δ' ὅπερ ἐν διανοίᾳ κατάφασις καὶ ἀπόφασις, τοῦτ' ἐν ὀρέξει διωξις καὶ φυγή, ὡς' ἐπειδὴ ἡ ἠθικὴ ἀρετὴ, ἕξις προαιρετικὴ, ἡ δὲ προαίρεσις, ὄρεξις βλαπτικὴ, δεῖ διὰ ταῦτα, τὸν τε λόγον ἀληθῆ εἶναι, καὶ τὴν ὄρεξιν ὀρθήν, εἰ περ ἡ προαίρεσις σπυδαία· καὶ τὰ αὐτὰ, τὸν μὲν φάναι, τὴν δὲ διώκειν. αὕτη μὲν ἔν ἡ δianoia καὶ ἡ ἀλήθεια πρακτικὴ.—Aristot. Ethic. Nicom. lib. vi. cap. 2.*

of love to God and good will towards each other, and shines out in all the living portraits of active virtue, constituting that illustrious branch of wisdom, which has been distinguished by the name of charity¹³.

Having endeavoured, by these preliminary observations, to ascertain and define the proper boundaries of this branch of learning, which is of vast extent and comprehension, and which has been treated in general in a desultory and promiscuous way, by poets and orators, by moralists and divines; we shall descend with the greater precision to what are properly called the principles of ethics.

¹³ See p. 4 *supra*.

SECT. II.

The Ethical Principle.

THAT native and original evidence, which is the first principle of all morality, forms an instinct of our common nature, implanted in the human breast by the hand which formed it, interwoven in the very stamina of our constitution, and given, as all instincts are, to direct us to our good. This is another first and universal inlet of knowledge to the mind; and some philosophers have very properly given it the name of internal or moral sense, in contradistinction to external sense, the other great and universal inlet of natural light¹: which different evidences or

¹ Notandum tamen, lumen naturæ duplici significatione accipi. Primo, quatenus oritur ex sensu, inductione, ratione, argumentis, secundum leges cœli ac terræ: secundo, quatenus animæ humanæ interno affulget instinctu, secundum legem conscientiæ, quæ scintilla quædam est, et tanquam reliquiæ, pristinæ et primitivæ puritatis. In quo posteriore sensu præcipue particeps est anima lucis non-nullæ, ad perfectionem intuendam et discernendam legis moralis. Bacon. De Augm. Scient. lib. ix. cap. 1.

first principles of knowledge, in their several operations upon things, form indeed the clearest and most philosophical distinction between theoretical and practical truth. This evidence of internal sense is the dictate of conscience which reigns predominant in the human breast, as a remaining spark of its native light, and as an indelible witness of that consummate purity and perfection, in which it was originally designed. This moral principle of conscience has, by some philosophers, been justly represented as “God within us.” It derives its essential truth immediately from the presence of God, the moral governor, the beginning and end of all truth;—since the goodness of God, as it could not create man to be imposed on and deceived by his external senses, so neither could it have given him this internal sense to impose on or deceive his moral faculties. Locke was however of a contrary opinion, and this, we consider, the fundamental error of his *Essay on the Human Understanding*, in which he has been followed by Hartley and Priestley, and other celebrated writers. But if the authority of philosophers

be any thing on such a question, we may appeal to Bacon and Butler, as more than a sufficient counterpoise.

This native and internal sense is the immediate and involuntary criterion of a few general truths, which in their joint operation upon the mind lay the foundation of moral obligation, the source and spring of moral action.

One truth recognised by this internal sense is an essential difference in the quality of all moral thoughts and actions, and the general distinction of them into good and evil. By this intuitive sense, men pass a judgment both on their own thoughts and on those of others. In doing this, it is perfectly analogous to the external senses, for the discovery is made by the same immediate and intuitive discernment, by which they distinguish their respective objects: which analogy is strongly and pointedly expressed in the language of holy writ. As the carnal eye distinguishes “darkness from light, and light from darkness;” or the taste “bitter from sweet, and sweet

from bitter ;” so does the moral eye distinguish “ evil from good, and good from evil,” by a native faculty no less inherent and familiar, than that of seeing colours, hearing sounds, or distinguishing tastes are in their proper and respective organs².

By the same instinctive impulse of its own, the mind is informed of another universal truth, the existence of the will, that sublime and distinguishing prerogative of man, by which he is enabled to choose the good and avoid the evil. Long and subtle are the disquisitions which have been spun by the refinement of modern metaphysicians on that favourite topic, the freedom of the will. They might however in compassion to their readers, and in mercy to themselves, have saved much useless labour, only by changing the question, and disputing (for they are too ready to dispute every thing) the existence of the will at once. That the will is free, is an identical and convertible proposition. Where there is will, there

² See Bp. Butler’s Dissertation “ Of the Nature of Virtue,” and his three admirable Sermons upon Human Nature.—*Editor.*

is freedom; and where there is freedom, there is will. Dearly as the philosophers of old loved disputation, they had more regard for the honour of their logic, than to waste their syllogisms on so absurd a question.—All agency must be free to be moral, consequently will and freedom are identical.

It is also the same conscious and internal sense, which, on the voluntary commission of evil, wounds the breast with pungent involuntary pain; or which, on the voluntary performance of good, expands the heart with pure and involuntary pleasure. We not only pass a discriminating judgment on moral thoughts and actions, as right or wrong, true or false; but we condemn some as deserving of punishment, and approve others as worthy of reward. From these native sentiments, springing out of our very frame, another universal truth therefore results, by immediate implication—that all good will be succeeded by reward, and all evil by punishment. “Wickedness,” in the elegant and pointed language of Solomon, “condemned

by her own witness, and being pressed by conscience, always forecasteth grievous things³.”

These great and universal truths operating upon the mind of man,—that superior and diviner part of his existence,—by a necessary and incessant impulse, imply with the aid of a little reason the existence of a superior law, to which we are necessarily obliged, and consequently the existence of a moral governor. As the author of that law, he is the rewarder of all voluntary good, as consistent with his nature, and conformable to his will, the unchangeable standards of all moral truth, and he is the punisher of all voluntary evil, as adverse to both. These sentiments and convictions, not only evince the mind and will of the Moral Governor of the universe, and thus evidence his law; but they also declare that he is disposed to reward those who obey, and punish those who disobey that law. Thus we arrive at the ultimate foundation of all moral government and obligation, immovably fixed in

³ Wisdom, xvii. 11.

the attributes and will of God⁴, erected in his goodness, established in his justice, and sanctioned by his power.

From this foundation all religion springs. It is the obedience of man, the moral agent, to the will and law of God, the moral governor. Hence we see the light of nature taking its origin, as a part of the law uncreated and eternal, as a glimpse of the divine and immaculate light, shining though dimly in the breast of man. Hence we see that every man has the "law of God written in his heart," and is made amenable to a tribunal which is spiritual and invisible. And hence the apostle argues, that they, who, deprived of the advantage of a fuller and clearer light, by the dictates of con-

⁴ As it is the nature of the independent first Cause of all things, to be obliged by his own wisdom; so it seems to be the nature of all dependent intelligent beings, to be obliged only by the will of the first Cause.

"All things therefore (says Hooker, the great master of reason, *Eccl. Pol.* book i. sect. 2) do work after a sort according to a law, whereof some superior, to whom they are subject, is author; only the works and operations of God have him both for the worker, and for the law, whereby they are wrought. The Being of God is a kind of law to his workings; for that perfection which God is, giveth perfection to what he doeth."—*Warb. Div. Leg.* book i. sect. 4.

science and the guide of reason, conform their actions to the will of God, “are a law unto themselves⁵.”

All truth is therefore born of God. That which is natural springs every where from his works, and that which is moral results every where from his will, reflected on us by the medium of conscience or internal sense. This is God within,—that clear and invincible evidence of his Being, shining in the human mind, as a ray of the divine, and discovering to men in part his will, and by the performance of that will, through the merits of another, their way to happiness. Thus, even on the authority of this natural evidence, we may exclaim, with the royal psalmist—“Verily there is a reward for the righteous, doubtless there is a God that judgeth the earth⁶.”

As the external senses are the ultimate criteria of all material objects, this internal sense is the ultimate criterion of all moral actions; and though in its acts and opera-

⁵ Rom. ii. 14, 15.

⁶ Psalm lviii. 10.

tions as a guide to truth, it may be subsequent to them, it is prior both in use and dignity. In the analogy which subsists between these two great inlets of all human knowledge in their exercise and effects, we cannot but observe with admiration, that uniformity of design, which marks all the works of Him, who is unchangeable and the same, and that consistency of operation which pervades the universe. We know from too frequent experience, that as the former are liable, through ill habit or distemper, to be vitiated and even lost; so the other from corresponding causes is subject to corresponding effects. The eye, the most perfect of the senses, is liable to great injuries and disqualifications, and is often rendered incapable of its proper functions. The taste, from corresponding causes, is liable to corresponding defects and perversions. By long habit and abuse, the taste of some is known to relish that which is abhorrent to others. We are thus informed by an experience, which none can controvert, that the external senses, which are the inlets of our natural knowledge, and common to all men, are in some cases pro-

ductive of different and even contradictory sensations.—And because we find the same to be the case with conscience, why should Locke, or other philosophers, discard it as the native principle of moral truth? Though this sublime principle of morals, which is the theme of our present consideration, may sometimes have been so far weakened in its evidence, or perverted in its use, as even to persuade that great philosopher of its non-existence⁷; it is an authority so supreme and permanent in the jurisdiction of the human mind, and so properly innate, that its power can never be entirely banished or discharged, till the mind itself is totally changed or annihilated.

⁷ See Mr. Locke's first book on *Innate Practical Principles*, chap. iii. sect. 8. "If conscience be a proof of innate principles, contraries may be innate," &c.

The principles however, both speculative and practical, which Mr. Locke is in this book proving not to be innate, are maxims and general propositions; not evidences, but axioms; not primary but secondary principles: which indeed so far from being innate are generally the conclusions of much reasoning and investigation. Yet, that many of these maxims are implanted in the mind by nature, as the foundations and principles of all its knowledge, never to be questioned, but always to be assumed and granted, was a fundamental and most inveterate error, which this great man combated with success.

SECT. II.

Of Ethical Reasoning.

UPON these congenial and collateral truths,—the distinction between good and evil, the existence of the will, reward and punishment,—implicitly resulting from the same first principle, and acting, as they always do, in perfect conjunction and unison, all moral reasoning is ultimately founded.

Convinced by experience of their uniform operation on ourselves in particular instances perpetually occurring, and beholding that uniform operation still more confirmed by the experience and observation of all others, in every stage and sphere of life, and by the records of all ages,—we are obliged, by a kind of tacit induction, to admit the truth of two moral propositions corresponding to each other, which are universal in their operation and extent:—

“ All voluntary good will have reward.”

“ All voluntary evil will have punishment.”—

Such are the two cardinal axioms, or secondary principles, from which the authority of all ethical deductions is derived, and on which they ultimately depend.

But all morality consists of particular actions, deriving their specific character and complexion from different relations. These moral actions are varied and multiplied by the triple relation in which men are placed—first, to God their moral governor; secondly, to men their fellow-subjects in their different stations and connexions; and thirdly, to the purity and propriety of their own personal characters. Hence they swell into such number and complexity, that reason can neither distinguish the precise nature of their good or evil, nor apportion with sufficient discrimination their reward or punishment, by reducing them under one or the other of these universal axioms directly, or by any single effort, so as to define and ascertain their moral truth.

From a view of these relations therefore

moralists are under the necessity of arranging actions in different kinds and classes, of ascertaining in each its specific good or evil, and apportioning to every class its just degree of reward or punishment. Under each relation, they form propositions less general than others, as mediate principles or middle axioms subordinate to them. To these all particular actions, as they occur in the different departments of moral government, are referred, in order to derive from them their specific truth.

It is in the formation of these axioms or secondary principles, in every branch of moral science, that the force of ethical reasoning is principally exerted. The method which it employs is consequently inductive. Morality in all its parts consists of individual or particular cases¹, and it is on the observation of a number of these individuals or particulars, possessing the same qualities and determinations, adduced and

¹ Ἔστι δὲ τῶν καθ' ἕκαστα καὶ τῶν ἐσχάτων, ἅπαντα τὰ πρακτά· καὶ γὰρ τὸν φρόνιμον δεῖ γινώσκειν αὐτά.—Aristot. Ethic. Nicom. lib. vi. cap. 11.

collected, that general propositions are established.

On the foundation of these inductive aggregates are erected all the systems of moral science, differing from each other, according to the relations. From the relation in which men stand to the Deity and his different attributes exercised towards them, results a train of numerous correlative obligations, which considered as general laws form the system of theology. As the great society of mankind is divided into communities and states, from the relations subsisting between them, spring those reciprocal duties which form the system of the law of nations. As these communities and states split and divide into smaller bodies, collective and individual, more numerous and complex relations arise, productive of more numerous offices, forming the system of civil law; of which many parts for public utility are enacted and sanctioned by public authority. As these larger bodies are again broken into families, the duties which arise from domestic relation become more personal and confined, and form the system of econo-

mical prudence. And as each individual in every station and situation of life owes an obligation to his neighbour and himself, and to the value of his character, as a free and moral agent, possessed of many privileges and distinctions ; from the discharge of these obligations many personal and most important duties result, which constitute the system of ethics in its more appropriate sense.

From this short view of man in his several relations, how different, how various, and numerous are the species of moral action in which he is capable of being employed ! And it is no mean honour which is due to the science in contemplation, and to the logic which it employs, that, when they are well-adjusted and arranged in general and subordinate classes, with their appropriate names and characters, as those of particular duties and sins, virtues and vices, the nature of each particular action, with the correspondent proportion of praise or blame, reward or punishment, may be determined with some competent measure of philosophic exactness and precision.

After the axioms are once founded in the several divisions of moral science, it only remains to apply particular actions to them, as general rules, the truth of which they will in general easily determine. This is however sometimes an act of nice judgment and acute discrimination. The difficulty arises, partly in selecting the right rule to which the action belongs, out of many others similar and nearly akin; but chiefly in accurately distinguishing the action, which varies its moral feature with the circumstances attending it, insomuch that cases occasionally occur so singular and special, that no rule has yet been formed to which they can be reduced.

When the general propositions happen to lie at a considerable distance from the particular cases to be proved by them, so that the reasoner has to ascend through a range of mediate propositions, syllogistic reasoning may have its use. But if the discovery of truth be his only object, he will find it in the course of a very few syllogisms, and without the parade of a protracted disputa-

tion. For their private amusement indeed men may syllogize as much as they please, if they do not annoy the public ; but they should do inductive reasoning the justice to allow, that till general ideas are formed, there can be no definition², and consequently no syllogism ; and when they are formed, whether the definitions be good, or the syllogisms conclusive, does not so much depend on themselves, as on the soundness of the induction by which they are generalized.

Between inductive and syllogistic reasoning therefore on ethical as well as on physical subjects, and indeed on all others³, excepting

² *Ορίσμος ἐκ γένους καὶ διαφέρῶν ἐστίν.*—Aristot. Top. lib. i. cap. 8.

³ Etiam dubitabit quispiam potius quam objiciet ; utrum nos de naturali tantum philosophia, an etiam de scientiis reliquis, logicis, politicis, secundum viam nostram perficiendis, loquamur. At nos certe de universis hæc, quæ dicta sunt, intelligimus : atque quemadmodum vulgaris logica, quæ regit res per syllogismum, non tantum ad naturales, sed ad omnes scientias pertinet ; ita et nostra, quæ procedit per inductionem, omnia complectitur. Tam enim historiam et tabulas inveniendi conficimus de ira, metu et verecundia, et similibus ; ac etiam de exemplis rerum civilium : nec minus de motibus mentalibus memoriæ, compositionis et divisionis, judicii, et reliquorum ; quam de calido et frigido, aut luce, aut vegetatione, aut similibus.

mathematics, how slight is the comparison in respect of logical value! Induction proceeding on experience and practice, however slow in operation, is sure in its effect. Syllogism proceeding generally on speculative, vague, and ill founded axioms, however ready, is fallacious; and has produced no other effect, than that of filling many a useless and unwieldy volume with loads of learned lumber⁴. “The moral treatises,” says our great reformer, “which are not seasoned with experience, but drawn only from a general and scholastic notion of things, are, as touching such matters, commonly idle and fruitless discourses.—For

Sed tamen cum nostra ratio interpretandi, post historiam præparatam et ordinatam, non mentis tantum motus et discursus (ut logica vulgaris), sed et rerum naturam intueatur; ita mentem regimus, ut ad rerum naturam se, aptis per omnia modis, applicare possit. Atque propterea multa et diversa in doctrina interpretationis præcipimus, quæ ad subjecti, de quo inquirimus, qualitatem et conditionem, modum inveniendi nonnulla ex parte applicent.—Bacon. Nov. Org. lib. i. aph. 127.

⁴ Eximie hoc atque verissime Afranius poëta de gignenda comparandaque sapientia opinatus est, quod eam filiam esse Usus et Memoriae dixit. Eo namque argumento demonstrat, qui sapiens esse rerum humanarum velit, non libris solis, neque disciplinis rhetoricis dialecticisque opus esse; sed oportere eum versari quoque exerceri in rebus comi-

the labours of speculative men in active matters, do seem to men of experience little better than the discourses of Phormio appeared to Hannibal, who esteemed them only as dreams and dotage⁵.”

We have here attempted a compendious sketch of the general office of reason in the province of morality. From the interest which the human mind must naturally and necessarily take in questions of moral action as the criterion of happiness, this

nus noscendis periclitandisque: eaque omnia acta et eventa firmiter meminisse; et proinde sapere ac consulere ex his, quæ pericula ipsa rerum docuerint, non quæ libri tantum aut magistri per quasdam inanitates verborum et imaginum, tanquam in mimo aut somnio dicitaverint. Versus Afranii sunt in Togata, cui Sellæ nomen est:

Usus me genuit, mater peperit Memoria.
Σοφίαν vocant me Graii, vos Sapientiam.

Item versus est in eandem ferme sententiam Pacuvii, quem Macedo Philosophus, vir bonus, familiaris meus, scribi debere censebat pro foribus omnium templorum:

Ego odi homines, ignava opera, et philosopha sententia.

—Nihil enim fieri posse indignius neque intolerantius dicebat, quam quod homines ignavi ac desides, operti barba et pallio, mores et emolumenta philosophiæ in linguæ verborumque artes converterent; et vitia facundissime accusarent intercutibus ipsi vitiis madentes.—A. Gellius, lib. xiii. cap. 8.

⁵ Tractatus autem, qui experientiam non sapiunt, sed ex

science has been the subject of more general investigation in every age, than any other. The old philosophers honoured it with especial regard. Socrates, the father of the ancient moralists, was said on that account to have brought philosophy down from heaven, and to have introduced her into the society of men⁶. He enhanced his worth and dignity as a philosopher, in the estimation of the Roman orator, by relinquishing physical studies, of which the ancients, from a wrong method of pursuit were mainly ignorant, that he might devote his attention

notitia rerum generali et scholastica tantummodo deprompti sunt, de rebus hujusmodi inanes plerumque evadunt et inutiles. Quamvis enim aliquando contingat, spectatorem ea animadvertere, quæ lusorem fugiant; atque jactetur proverbium quoddam magis audaculum, quam sanum, de censura vulgi circa actiones principum, *stantem in valle optime perlustrare montem*; optandum tamen imprimis esset, ut non nisi expertissimus et versatissimus quisque se hujusmodi argumentis immisceret. Hominum enim speculativorum, in materiis activis, lucubrationes, iis, qui in agendo fuerint exercitati, nihilo meliores videntur, quam dissertationes Phormionis de bellis æstimatæ sunt ab Hannibale, qui eas habuit pro somniis et deliriis.—Bacon. De Augm. Scient. lib. vii. cap. 2.

⁶ Primus philosophiam devocavit e cœlo, et in urbibus collocavit, et in domos etiam introduxit.—Cic. Tusc. Quæst. lib. v.

to morality alone⁷. Xenophon and Plato have recorded the precepts of their divine master in a familiar and instructive manner, characteristic of the dignity and simplicity of his exalted mind. Aristotle, the disciple of the last, has collected the ethics of antiquity, and arranged them in a clear and lucid system. He did this apart from all logical modes and figures. He has drawn all the virtues with great exactness of truth and nicety of distinction, and has treated the whole subject of ethics in a concise, elegant, didactic style. When we consider the extent and variety of his studies, the relative disadvantages under which he laboured, and the age in which he lived; when we view this great moralist, as unacquainted with that evangelical truth, by whose divine maxims future moralists have profited, but which did not appear on this terrestrial stage, till two centuries after his departure; we cannot contemplate his system of morality,

⁷ Socrates mihi videtur primus, a rebus occultis et ab ipsa natura involutis, in quibus omnes ante eum philosophi occupati fuerunt, avocavisse philosophiam, et ad vitam communem adduxisse, ut de virtutibus et vitiis, omninoque de bonis rebus et malis quæreret.—Ibid. Acad. lib. i. cap. 4.

whether for the purity of its general maxims, the value of its collection, or the justness of its arrangement, without sentiments of the profoundest love and admiration.

Many and valuable are the precepts of the sages of antiquity, and though sometimes defective in their matter, on account of the false or partial principle of moral obligation from which they sprung, both the method and style in which they are delivered, form admirable models of all future imitation. Their defects are owing to the separation which they made of the three great and fundamental truths⁸, on the inviolable union of which all moral reasoning should be grounded,—Plato having been exclusively the patron of the one, Aristotle of the other, and Zeno of the third—above all; in not paying a just attention to the true origin and end of all moral action,—the will and attributes of God.

Some of our modern philosophers have not only neglected their virtues, but have

⁸ “On these three principles,—the moral sense, the essential difference in human actions, and the will of God,—is built the whole edifice of practical morality.”—Warburton.

imitated and outraged their faults, although a far more perfect exemplar of morality has been received from heaven. In their eternal squabbles about the true foundation of morality, and the obligation to its practice, they have sacrilegiously untwisted this threefold cord ; and each running away with the part he esteemed strongest, hath affixed that to the throne of God, as the golden chain that is to unite and draw all to it”—
“ Thus a spirit of dispute and refinement hath so entangled and confounded all our conclusions on a subject, in itself very clear and intelligible, that were morality herself, of which the ancients made a goddess, to appear in person among men and be questioned concerning her birth, she would be tempted to answer as Homer does in Lucian, that her commentators had so learnedly embarrassed the dispute, that she was now as much at a loss as they to account for her original.”
“ Thus have men, borne away by a fondness to their own idle systems, presumptuously broken in upon that triple barrier, with which God has been graciously pleased to cover and secure virtue, and given advan-

tage to the cavils of libertines and infidels; who, on each of these principles thus advanced on the ruins of the other two, have reciprocally forged a scheme of religion independent of morality, and a scheme of morality independent of religion; who, how different soever their employments may appear, are indeed but twisting the same cord at different ends, the plain design of both being to overthrow religion⁹.”

⁹ This quotation is made up of several distinct sentences in Warburton's *Legation*, book i. chap. 4, and can scarcely be understood, without referring to the original.

On the general subject of this chapter, consult Sir J. Mackintosh's *Dissertation on Ethical Philosophy*, Bishop Butler's *Sermons on Human Nature*, Blakey's *History of Moral Science*, Stewart's *Elements of Moral Philosophy*, Reid on the *Active Powers*, &c. &c.—*Editor*.

SECT. III.

Of Ethical Truth.

IN spite of all the difficulties thrown in the way of ethical science by the enemies of virtue, and the darkness which hath been drawn over the scene of moral action by many of its mistaken friends, moral truth is still able, by her native energy, to force her way through all the obstruction and obscurity in which she has been involved by art or ignorance.

“The divine Author,” says an able moralist and theologian, “hath so wonderfully contrived human nature, that there needs little more in moral matters, than plainly and clearly to represent any instruction to the mind, in order to procure its assent. Whatever be the instruction, whether it affirm this conduct to be virtuous, or that vicious, if the mind be in a natural state, it more than sees,—it feels the truth or falsehood. The appeal is directly made to cer-

tain correspondent sentiments of right and wrong instantly excited by the moral proposition¹.”

However vitiated and corrupted, the moral sense will never be extinguished ; and though the middle axioms and subordinate propositions, which are the means of ethical reasoning, may be multiplied by relations and varied by circumstances, and carried to a considerable extent. Ethical conclusions, as they are all ultimately founded on one or other of the universal principles of good and evil evinced by this predominant criterion, which carries its light down the whole of the moral scale, will always be accompanied with a clear and strong conviction.

Mr. Locke has indeed thrown out a conjecture in different parts of his celebrated Essay, that as ethical ideas are what he is pleased to call real essences, and archetypes of the mind's own making, complete and adequate in themselves, as well as mathematical ; and as demonstration in his mind

¹ Bp. Hurd, Sermon, vol. ii. xi.

was nothing but the perception of the agreement or disagreement of such ideas, by the proof or intervention of other ideas or mediums,—that morality is capable of demonstration as well as mathematics².

As parents are often so fond of their children, as frequently to suffer them to embarrass and bring them into difficulties; so has this philosopher been more than once led astray by his favourite ideas.

Had he considered the different origin and nature of these two sciences, he would have been delivered at once from this conjecture, with which he seems so much to have laboured. Mathematical ideas are purely speculative in their origin, and totally abstracted in their nature from every thing in the world. Morality originates in practice, and has its existence grounded in the actual nature of things, as they exist in the moral government of the universe. A circle or a triangle is professedly a creature of the mind, and whether either of them be actually found

² See book iii. chap. 11, § 16: and book iv. chap. 3, § 18; chap. 4, § 7; chap. 12, § 8.

in nature, (there are few if any strictly mathematical,) can make no difference in the truths of that speculative science. But whatever number of ethical ideas may be formed of the mind's own invention, unless they have a real and actual existence or correspondence in the moral relations and actions of men, they may be archetypes: yet instead of affording any kind or degree of ethical certainty, all they can produce in our most sanguine expectation, will be a train of demonstrations, which however they may suit the ethical constitution of imaginary agents or inhabitants of another world, can never be adapted to the moral practice of the present inhabitants of our earth.

But this wild and romantic expectation, by which he has outdone the arbitrary inventions and some notions of Aristotle and other sages of antiquity, is not only inconsistent with the origin and nature of morality, but defeated by the whole process of reason in both the sciences. However strong and clear ethical conviction may be in general, it is totally different from mathematical, both in

the principle from which it springs, in the method of proof by which it is evinced, and consequently, in the nature of its truth³.

The mathematician takes his ideas at first from the external senses, and assumes them at once in their general form, with little if any labour of inductive reasoning. The moralist, on the other hand, has his materials (for they are not properly ideas till generalized), from the evidence of internal sense, which is the direct counterpart of the other, and he meets all moral actions in their particular state.

Mathematical ideas, however numerous and extensive, are what this philosopher himself calls simple modes of quantity. Moral actions, on the contrary, are all complex modes of quality. In consequence of this distinction, which is quite philosophical, the former are capable of being univocally and mechanically expressed, of being precisely distinguished from each other, or from those of other kinds, and exactly measured. They are ready, at first, to be defined, and syllo-

³ See Dr. Reid's *Essays*, vol. ii. Essay 7; Stewart's *Elements of the Philosophy of the Mind*, vol. ii. chap. 2.

gistically compared. But the latter can never be so univocally and artfully expressed; nor distinguished with such precision, nor exactly measured (defects which no expedients can remedy⁴); neither can they be logically defined at all or compared syllogistically, till their general ideas are formed by previous induction and general propositions.

Thus in mathematics the method of reasoning begins where it ends in ethics, and is contrary throughout. In the one, it begins with definitions and general propositions, and advances from syllogism to syllogism, in which the minor as well as the major propositions are always general truths; which generality is indispensable to demonstration. In the other, the chief labour of reasoning,—by which many personal observations are taken, accurate investigations pursued, fine distinctions drawn, and so many particular comparisons are formed,—necessarily precedes the logical definition. When the general office or duty, with its correspon-

⁴ Mr. Locke's Attempt, book iv. chap. iii. § 26.

dent quality, has been inductively established in a general proposition, definition, by reducing particular actions under their general head, will itself terminate the logical process. Or if syllogism must be used, the minor propositions will be particular, so that there can be no demonstration: and to the mortification of disputants, one or at the most a very few syllogisms will be sufficient.

Ethical truth is therefore totally different from mathematical. When logically considered, and placed in a comparative point of view, it bears a nearer resemblance to physical truth, and physical to mathematical⁵.

Locke was that bold and adventurous philosopher, who led on by candid impar-

⁵ Physics and mathematics have the same first principle, the external senses; and when physical forms are generalized, mathematic can lend its reasoning, and they both terminate in speculative, not practical use. Ethics differ from both, in its first principle, the internal sense; and from mathematics, in the method of reasoning: but in this they agree with physics, that their subjects are individuals. They differ from both in their end, which is practical, not speculative.—Thus ethics and mathematics differ in *toto*.

tiality and reverence for truth, with a strong and liberal mind, left the beaten track of science, and took a new and untrodden path, in which he walked with great honour to himself and much advantage to the learned. To subvert doctrines of philosophy sanctioned by authority, to break through systems of education made venerable by time, and remove habits and prejudices by which the mind has been long enslaved, is a task which has ever been reserved for those few champions of philosophy, who are blessed with superior talent. His Essay produced a useful revolution in the republic of learning, and he may fairly be considered, as the second to Bacon, in improving the pursuit, and promoting the interests of general knowledge. When the navigator of an unknown sea, for the purpose of new discoveries, involves himself in difficulty, and perplexes himself in error, it is what we readily pardon, because it is what we naturally expect. The student and philosopher who embark in the spirit of improvement, in order to correct what was before erroneously adopted or imperfectly

known, will not only commend, but honour the same spirit in others, by which they themselves are corrected and improved.

The opinion however which he entertained in his *Essay*, of the demonstrability of ethics, he himself doubted of afterwards, and in part retracted in his *Familiar Letters*⁶. Philosophers, as well as navigators, derive great advantage from being well informed of the works and observations of those, who have gone before them. He would have neither entertained the opinion in the first instance, nor have doubted of it afterwards, had he not been unacquainted with the philosophy of demonstrative and syllogistic reasoning, for want of having studied with attention the *Analytics* of Aristotle, in which that deep philosophy is so particularly investigated. Nor was he less palpably mistaken in regard both to the principles and reasoning of morality; of which the book of *Topics*, however defective that part of the

⁶ Though by the view of moral ideas, whilst I was considering that subject, I thought I saw that morality might be demonstrably made out; yet whether I am able to make it out is another question.- Locke's *Fam. Let.* p. 10.

Organon may be, would have sufficiently informed him; by distinguishing those subjects which are capable of probability, from those which admit of demonstration⁷. Above all, the metaphysics of Aristotle, which, however defective, should be attentively studied by every future metaphysician, would have taught him, that not to know what is demonstrable and what is not, constitutes a prominent mark of ignorance⁸.

Upon the whole, Locke like many other philosophers, has been more at a loss on moral subjects, than in any other part of learning. Too anxious for the simplicity

⁷ The attempt which Mr. Locke has shown, in different parts of his Essay, to make morality demonstrable like mathematics, is a sufficient proof that he was unacquainted with the old logic derived originally from Aristotle. The method by which he hoped to make the attempt succeed, viz. by proving the agreement or disagreement of ethical ideas by the application and mensuration of a third or medium, forms an additional proof, that the logic he espoused was the new one, founded on the first axiom of Euclid, which is more partial and imperfect than the old. And this is indeed strongly apparent in every part of his Essay.

⁸ Ἀξιῶσι δὲ καὶ τῷτο ἀποδεικνύναι τινὲς δι' ἀπαιδευσίαν, ἔστι γὰρ ἀπαιδευσία τὸ μὴ γινώσκειν τίνων δεῖ ζῆτεῖν ἀπόδειξιν, καὶ τίνων ἔ δεῖ.—Aristot. Metaph. lib. iv. c. 4.

and uniformity of this new analysis of the human understanding, he derives all our knowledge originally from one and the same source, that of external sense, to the exclusion of internal sense, the first inlet of all moral truth, which is of equal authority, co-extensive and essential in its use⁹. Hav-

⁹ To make way for his new philosophy, he employed the first book of his *Essay* to prove, that there are no innate principles, either speculative or practical: and, as by principles he means general propositions, most of which are neither known nor assented to without the exercise of many previous judgments, nor often without a great maturity and progress of reasoning, he had no great difficulty in overturning an absurd doctrine, though it had been received for ages. In the second book, he proceeds to trace all ideas, by which he means whatever is the object of thinking, to their original in the external senses alone, as the inlet of all knowledge, both speculative and practical: so that neither are they innate. Still this word is not to be excluded from the philosophy of mind.—That the eye distinguishes black, white, red, yellow, is a faculty innate in that organ, or whence is it derived? But to apprehend love and hatred, good and evil, is not at all in the power of that external organ. No: we feel that it belongs to a faculty within the breast, which is likewise innate; and which we, therefore, call consciousness. These innate faculties are, therefore, different, and independent of each other; from which we, accordingly, receive the different materials of all our knowledge, speculative from the one, and practical from the other: they are, therefore, first principles of knowledge. And, as the one is properly called natural or external sense; the other, by its correspondent analogy, is as properly called moral or internal sense.

ing thus lost one of the eyes of truth in the outset of his journey, which should have been his guide through some of the most abstruse and difficult passages; we cannot be surprised that his moral philosophy should form the glaring and conspicuous defect of this invaluable Essay.

SECT. IV.

The Perfection of Moral Virtue.

THE inferior but more useful parts of ethical wisdom, which are necessary to ensure the peace and existence of society, to direct the conduct of individuals to their necessary well-being, and to enforce the ordinary duties of human life, are impressed on the minds of all men with a clear and obvious conviction. But, when we reflect, that the whole moral law is a transcript of the unsearchable will of the great Governor of the universe, we may easily suspect, that but a small and partial glimpse of this celestial light illumines the human intellect. Though from just observa-

tions on the ways of his providence, and by the due exercise of reason, men may hope to develop some of his less obvious dispensations; yet we may suspend our wonder, if philosophers ancient and modern, who have attempted (and the attempt conducted by humility and discretion does honour to human nature), to look with a more searching eye into the deeper counsels of the Almighty, to scan the secrets of his will, and reduce them to the formalities of system, have been disappointed in their object, and that in subjects of morality, error has frequently assumed the face of truth. They have failed in their researches from an inadequate knowledge of God, as the foundation of morals, and from a misconception of man, as the subject of morals,—above all,—from their ignorance of the doctrine of the fall, and of that inestimable remedy, which has been provided by the gospel for our sins and infirmities.

Though the Deity has never been wanting in the discovery of himself to the meanest of his rational creatures, the sublimer parts of his divine economy are reserved as mys-

teries too exalted for the natural faculties of the highest to investigate, and even for their largest capacities to comprehend¹, however competent to embrace some parts when discovered, or to acquiesce in others². Our great philosopher and reformer of all learning human and divine, has therefore referred reason in respect of the whole of the divine law, moral as well as positive, to revelation, as affording that clear and certain light, on which it can firmly and securely rely³.

Besides the stupendous mysteries it unveils, which are positive and doctrinal, it delivers a new and more perfect system of moral duties, founded on their true and proper principle, as the directory of our lives and actions—a divine philosophy unconscious of all error, and free from imperfection, and which is carried to that height of purity and sublimity

¹ Nec illud dubitandum est, magnam partem legis moralis sublimiorem esse, quam quo lumen naturæ ascendere possit.—Bacon. De Augm. Scient. lib. ix.

² Particeps est anima lucis nonnullæ ad perfectionem intuendam et discernendam legis moralis; quæ tamen lux non prorsus clara sit, sed ejusmodi ut potius vitia quodatenus redarguat, quam de officiis plane informet.—Ibid.

³ Quare religio, sive mysteria sive mores spectes, pendet de revelatione divina.—Ibid.

of which reason is lost in admiration. No code of ethics, ancient or modern, is so full or precise, none so clear or consistent, none so practical, none so practicable, and above all none so authoritative, as the morality of the eternal gospel. This is the new law, as distinguished from the old, or the law of nature, not only as being more perfect than any other moral system; but as conveyed to man by a new and living way.—Thus the new law constitutes the perfection of moral virtue.

To this code of evangelical ethics the philosopher should look up, as the polar star, whether to direct his studies or regulate his conduct. And here he will receive an admonition from the mouth of One, who was far wiser than all philosophers—“If ye know these things, happy are ye if ye do them⁴”—which instructive benediction, with clear and elegant precision, divides moral science into its two distinct and general parts—the knowledge and the practice⁵.

⁴ John, xiii. 17.

⁵ Partiemur igitur ethicam in doctrinas principales duas; alteram de exemplari sive imagine boni; alteram de regi-

The former, under the luminous precepts of the Gospel, being a work of more obvious and easy execution, and admitting of a more florid and popular display, has been cultivated by moralists and divines with competent success⁶. The latter, which gives to it operation and effect, and which constitutes the life of all morality, requiring a deeper investigation into particulars and a more philosophical research, has been at all times too much neglected⁷. The necessity of this part was felt and acknowledged by the

mine et cultura animi, quam etiam partem georgica animi appellare consuevimus: illa naturam boni describit, hæc regulas de animo ad illam conformando præscribit.—Bacon. De Augm. Scient. lib. vii. cap. 1.

Hanc igitur partem (quando præstantiam ejus in animo recolo) in corpus doctrinæ nondum redactam, non possum non vehementer mirari. Eam igitur, ex more nostro, cum inter desiderata collocemus, aliqua ex parte adumbrabimus.—*Ibid. lib. vii. cap. 3.*

See this part of morality opened by Lord Bacon.

⁶ *Proposuerunt nobis exemplaria bella et luculenta atque descriptiones sive imagines accuratas, boni, virtutis, officiorum, felicitatis, tanquam vera objecta, et scopos voluntatis et appetitus humani: verum quomodo quis possit optime ad hos scopos (excellentes sane et bene ab illis positos) collimare; hoc est, quibus rationibus et institutis animus ad illa assequenda subigi et componi possit, aut nihil præcipiunt, aut perfunctorie et minus utiliter.—Ibid. lib. vii. cap. 1.*

⁷ *Delegerunt sibi philosophi in ethica massam quandam*

Peripatetic, whose large and comprehensive mind embraced the confines and marked the dependencies of all learning, and who gave a promise to descend to the execution of this interesting work⁸. This promise however does not appear to have been performed, unless very incidentally in his book of rhetoric, in any of those works which have descended to us⁹.

This is the philosophy of the human heart, which, by a nice and judicious search inquires into its secret springs and motions, discovering the latent seeds of all those passions and affections which are the issues and elements of moral life. This philosophy

materiae splendidam et nitentem, in qua potissimum vel ingenii acumen, vel eloquentiae vigorem venditare possint: quæ vero practicam maxime instruunt, quandoquidem tam belle ornari non possint, maxima ex parte omiserunt.—
Ibid.

⁸ Δεῖ ἄρα ὡς ἔοικε πρῶτον ὑπὲρ ἀρετῆς εἰπεῖν, τί τέ ἐστι, καὶ ἐκ τίνων γίνεται. οὐθὲν γὰρ ἴσως ὄφελος εἰδέναι μὲν τὴν ἀρετὴν, πῶς δὲ ἂν, καὶ ἐκ τίνων, μὴ ἐπατεῖν. οὐ γὰρ μόνον ὅπως εἰδήσομεν τί ἐστι, σκοπεῖσθαι δεῖ, ἀλλὰ καὶ ἐκ τίνων ἐστὶ, σκέψασθαι. ἅμα γὰρ εἰδῆσαι βουλόμεθα, καὶ αὐτοὶ εἶναι τοιῶτοι. τῆτο δὲ οὐ δυνησόμεθα, ἐὰν μὴ εἰδῶμεν καὶ ἐκ τίνων, καὶ πῶς ἂν. ἀναγκαῖον μὲν οὖν εἰδῆσαι τί ἐστὶν ἀρετῆ. οὐ γὰρ ῥάδιον εἰδέναι τὸ ἐκ τίνων ἂν, καὶ πῶς ἂν, ἀγνοοῦντα τὸ τί ἐστι, ὥσπερ ἔδ' ἐπὶ τῶν ἐπιστημῶν.—
Aristot. Mag. Mor. lib. i. cap. 1.

⁹ We have some good ground to believe that he reserved

does not rest in general speculation, but descends to particular experiment and observation. It consults the native bent of every disposition, marks the different tempers and characters of men, whether cast by nature or formed by art, descending to all the propensities of sex, age, country, and condition of life. Thus every disorder of the mind can be traced to its distinct and proper cause with the remedy to be applied, if any remedy can prevail. Thus by a due correction and proper culture of the mind some affections can be promoted, whilst others are suppressed, which may gradually extirpate the seeds of vice and cherish those

this important topic of moral investigation to form the crown and conclusion of his poetics. “Tres de Poeticâ libros conscripsisse Aristotelem memorat Laërtius—tertium (cujus interitum delemus maxime) *περὶ καθάρσεως*, sive *κατορθώσεως* disceptasse crediderim, h. e. de Animorum Purgatione a Pravis Affectibus, deque Emendatione Morum. Quem quidem apud veteres, Poeticæ Imitationis probe constitutæ præcipuum ac proprium fuisse finem, nil dubium est. Sed quia, propter multiplices vitiorum formas, complura *καθάρσεως* illius capita fusiorem tractatum desiderarint, obiter illam sane nec nisi verbo tetigit Philosophus in Poeticis (cap. 8 in fine) ejusque rationum ad hoc opus, tanquam ad latiore campum fusius ac sigillatim explicandam retulit.”
—Goulst. in Synop. Aristot. Poet.

See pp. 220, 221 of this volume.

of virtue ; as the physician consults alike the constitution of his patient and the cause of the disease, to correct the habit or apply a successful cure.

Still however clear the conviction and captivating the charms of moral truth, men will often resist her evidence and disgrace her beauty. They may embrace and honour virtue in idea, as leading to the greatest good, whilst they reject and dishonour it in practice ; for passion, which is of a contrary interest, too often proves an overmatch for reason, and prevails upon the will to cultivate apparent happiness at the shrine of pleasure. And “ this is the true cause of all that disorder and inconsistency in the life of man, which the philosopher affects to admire, which the divine laments, and for which the moralist could never find a cure¹⁰.”—But these great defects of natural reason, it hath pleased the Moral Governor to supply by revelation, to which we are now directed to apply for more full and perfect

¹⁰ Warb. Divine Legation.

information on all subjects of morals. For clear and decisive as are the great principles of natural religion and moral obligation, and however successfully human reason may have combated the errors of the atheist and materialist, yet the truths resulting from the natural and unassisted faculties of man, have always been, both in knowledge and practice, most deplorably erroneous and defective. This has arisen from the want of a more perfect knowledge of the will of God, which is the universal law, and from a want of sufficient evidence of those rewards and punishments, which are the sanctions of that law. But as these do not take place in the present life, they formed the strongest proof to natural reason for the expectation of another. Yet even this was not sufficient for popular conviction, till the doctrine “ of life and immortality was brought to light by the Gospel.”

The power of doing, as well as the opportunity of knowing, we owe especially to Him, who not only gave the instruction, but seconded and illustrated that instruction by

his own example, which he has promised to aid with the Holy Spirit.—Such is the superiority of Christian ethics.

Moral virtue never appeared on earth with that native brightness or with those powerful charms, by which she is enabled at once to convince the understanding and captivate the heart, till brought down from heaven by one, who “knew what is man;” who has displayed her in himself in all perfection, and can invest her with all power; who “opened his mouth in parables,” and introduced her with beauty, authority, and effect into this lower world.—Till that halcyon era, human nature had lain buried in “the works of darkness” and “the shadow of death.” It was then invited into “light and life” by the call of that prophetic and evangelic voice—“Awake thou that sleepest, and arise from the dead, and Christ shall give thee light¹¹.”

¹¹ Isaiah, lxii. 1, and Eph. v. 14.

CHAP. VII.

POETRY.

SECT. I.

The Logic of Poetry.

FROM the ethical, we are led by our general plan to the poetical province, which is subject to the faculty of imagination, or mind employed in producing some inventive or imitative effect¹.

After distinguishing the theoretical division both from the practical and poetical, by observing that the truth of the first originates in its proper subject and terminates in itself, whilst that of the other two originates in the mind of the agent moral or poetical, and respects some further end²; Aristotle has

¹ Διάνοια ποιητική. See p. 222.

² See p. 220, 221.

drawn the line between morality and poetry, according to the different ends they have in view—actions and arts³. By arts, he means the elegant, as distinguished from the manual or mechanical arts, which form the various inventions of men reduced to rules and system for the production of the various needs and accommodations of human society.

To place this general distinction in a still fuller point of light, we may observe, that as the object of ethics is the knowledge of the different species of moral good and evil, with a view to the right conduct of life; so the objects of poetry, taken in its greatest latitude

³ Τῷ δὲ ἐνδεχομένῳ ἄλλως ἔχειν ἔστι τι καὶ ποιητὸν, καὶ πρακτόν. ἕτερον δὲ ἐστὶ ποιήσις, καὶ πρᾶξις· ὥστε καὶ ἡ μετὰ λόγου ἔξις πρακτικῆ, ἕτερόν ἐστι τῆς μετὰ λόγῳ ποιητικῆς ἔξεως. καὶ οὐδὲ περιέχεται ὑπὲρ ἀλλήλων. οὔτε γὰρ ἡ πρᾶξις, ποιήσις, οὔτε ἡ ποιήσις, πρᾶξις ἐστίν. ἐπεὶ δ' ἡ οἰκοδομικῆ, τέχνη τις ἐστίν, καὶ ὅπερ ἔξις τις μετὰ λόγῳ ποιητικῆ, καὶ οὐδεμία ἕτε τέχνη ἐστίν, ἥτις οὐ μετὰ λόγῳ ποιητικῆ ἔξις ἐστίν, ἕτε τοιαύτη, ἢ ἡ τέχνη, ταυτὸν ἂν εἴη τέχνη καὶ ἔξις μετὰ λόγῳ ἀληθοῦς ποιητικῆς. ἔστι δὲ τέχνη πᾶσα περὶ γένεσιν, καὶ τὸ τεχνάζειν, καὶ θρωρεῖν, ὅπως ἂν γένηται τι τῶν ἐνδεχομένων καὶ εἶναι, καὶ μὴ εἶναι· καὶ ὧν ἡ ἀρχὴ ἐν τῷ ποιῶντι, ἀλλὰ μὴ ἐν τῷ ποιημένῳ. ἕτε γὰρ τῶν ἐξ ἀνάγκης ὄντων, ἢ γινομένων, ἢ τέχνη ἐστίν, ἕτε τῶν κατὰ φύσιν· ἐν αὐτοῖς γὰρ ἔχουσι ταῦτα τὴν ἀρχὴν· ἐπεὶ δὲ ποιήσις καὶ πρᾶξις ἕτερον, ἀνάγκη τὴν τέχνην ποιήσεως, ἀλλ' ἢ πράξεως εἶναι. ἢ μὲν δὲν τέχνη, ὥσπερ εἴρηται, ἔξις τις μετὰ λόγῳ ἀληθοῦς ποιητικῆς ἐστίν.
—Ethic. Nicom. lib. vi. cap. 4.

of meaning, are the elegant arts, and their proper end is pleasure, accompanied with useful instruction—"prodesse delectando"⁴; the excellence and perfection of which depend on their correspondence to truth, under the conduct of reason⁵. Such is the theory; but it must be admitted that imagination by its native vigour often produces the highest poetical effect, without the art of reasoning. But this arises, as it were, from

⁴ Hoc enim maxime videtur interesse inter philosophum et poetam, quod cum utriusque idem sit consilium, alia tamen alii id quod velit consequendi sit ratio. Uterque docentis personam sustinet: quam quidem alter ita optime tueri censetur, si clare doceat, si subtiliter, si enucleate; alter, si jucunde, ornate, suaviter, eleganter. Ille ab affectibus ad rationem unice provocat; hic ita rationem appellat, ut affectus etiam in suas partes studeat pertrahere. Ille ad virtutem et veritatem proxima et compendiaría semita utitur; hic per itinerum flexiones quasdam et diverticula, sed amœniore via, eodem ducit. Illius denique est utramque ita exponere et nudare, ut necessario eas agnoscamus; hujus ita easdem ornare et vestire, ut amemus ultro et amplectamur.—Lowth Poet. Præl. i. p. 4.

⁵ Ars est secunda virtus intellectualis practica, quæ definitur, habitus cum recta ratione effectivus.

Objectum ejus sunt omnia illa, ex quibus tanquam materia aliquid potest effici.

Artificis officium in tribus consistit: primò, in speculando: secundò, in fabricando: tertio, in perficiendo, ut opus producat.—Langb. Ethic. p. 77.

chance, through the force of unassisted genius⁶.

In both the theoretical and practical departments, the mind in the production of truth acts and judges within itself; in the arts, it passes to some external operation, by which it produces an effect from which the truth results. The arts are, therefore, the energies of mind, producing effects in different ways and by different means; but no energy of the human mind can actually create. It can only imitate the works of nature material or mental, and by variously joining and combining them together form new images of things, which in nature have no real existence. Hence the faculty by which these energies are exercised is called imagination. This is the proper office of poetic art in general, which consists in various imitations formed by the imagination, that prolific faculty of the mind which gives a kind of

⁶ Καὶ τρόπον τινὰ περὶ τὰ αὐτὰ ἔστιν ἡ τύχη καὶ ἡ τέχνη, καθάπερ καὶ Ἀγάθων φησὶ,

Τέχνη τύχην ἔσπερξε, καὶ τύχη τέχνην.

—Aristot. *Ethic. Nicom.* lib. vi. cap. 4.

second creation to all the works of nature, which generalizes and enlarges their comprehension, heightens their beauty, and improves their charms⁷. This peculiarly pertains to poetic genius, and is termed Invention.

Art is the power in man, improved by habit and exercise, of becoming the cause by various means or instruments of producing some effect, according to a system of precepts formed by judicious experiment. Art in general, divides itself into specific kinds, according to the means or instruments employed, and in every kind, its effect must be either a production whose parts are coexistent, as that of a statue, painting, or poem,

⁷ Πολλὸν ἐν ταῖς τεχναῖς μιμνέμεναι τὴν φύσιν, καὶ τὸ παραλειπομένον ὑπ' αὐτῆς ἀναπληροῦσαις.—Simplicius in Aristot. Præd.

Etenim nimium angustis finibus continetur historia, nimium severas habet operis sui leges. Res gestas tradit, eventorum vestigiis insistit; quod contigit, non quod contigisse potuit aut oportuit, narrandum; nec quo documenti opportunitas, vel probabilitatis ratio vocat, sed quo facti necessitas cogit, eundum. Historia res et personas certas et constitutas tractat, infinitas et universales poesis: altera rerum causas incertis conjecturis consecatur; altera evidenter certeque demonstrat: altera fortuito elucentem veritatis imaginem captat; altera simplicem ejus formam intuetur: illa præscriptum iter certa via conficit; hæc liberis naturæ spatiis fruitur: illa demum argumento suo inservit; hæc dominatur.—Lowth Poet. Præd. i. p. 10.

which may be called a *work*; or whose parts exist in succession, as that of music, which may be called an *energy*. Where the effect is a work, its perfections cannot be perceived, till the work is finished; after which it may continue for many ages, when the artist is no more. Where the effect is only an energy, its perfection must be perceived during its execution, and it is only contemporary with the agent or artist⁸.

All the elegant arts are imitations, by which they are principally distinguished from the manual, and they differ from each other according to the means or materials which they respectively employ. Marble is generally the material of the statuary, and his instrument the chisel. The painter depends on colours, his instrument is the pencil. The musician employs the different sounds, and instruments of various kinds. The poet embodies his imagination in words, and his instrument is poetical diction⁹.

⁸ See Harris's Treatise on Art, and on Music, Painting, and Poetry.

⁹ See Stewart's Elements of the Philosophy of Mind,

SECT. II.

The Poetical Principle.

THE source from which the imitative arts originally derive their energy is imagination—that internal feeling or sensibility, which by a spontaneous operation recognises a wonderful variety of different sentiments, emotions, passions, and affections, according to all the modes and diversities of pleasure and pain, excited in the mind by the different objects, actions, passions, and events which occur in all the various scenes and circumstances of human life.

This native sensibility is therefore the first principle of poetic art, without which, genius could neither have the power to imitate in order to produce the effect designed, nor would the mind be enabled to recognise that effect, when it was produced.

vol. i. chap. 7; Du Bos on Poetry, Painting, and Music; Knight and Alison on Taste; Burke on the Sublime and Beautiful; Tyrwhitt on Aristotle's Poetic, &c.—*Editor.*

However different from the external and moral senses these internal sensibilities may be, we can observe a general analogy subsisting between them. As the different kinds of good and evil, when distinguished by the moral principle, form all the different classes and varieties of moral action ; so the different modes of pleasure and pain, as recognised by the poetical principle, give all their distinctive colours and varieties to the elegant arts. Nay, such is the general consistency and uniformity of things, that as we observe the external senses more perfect and the moral more acute, from their natural formation in some persons, than in others ; so we remark this other principle to prevail in different minds with greater or less degrees of delicacy and refinement. And as the former are liable to be injured in their exercise and perverted in their use by habit or accident, and capable of being corrected by an act of reason ; so is this poetical sense subject to be corrupted by habit, and corrected by good taste and sound criticism.

The higher degrees of this poetic feeling

are the rare and peculiar gift of nature ; when signalized with the highest imitative talent, the happy combination is distinguished by the name of genius ; and, when conducted by sound judgment, the result is taste. These endowments are more partially and capriciously bestowed than the other mental faculties. It is necessary there should be many moralists and philosophers, whilst a few poets will suffice for all the purposes of life, provided they are the best.

SECT. III.

Poetical Reasoning.

BUT what has reasoning, it may be asked, to do with the productions of genius and taste ? What has a dry and sombrous logic to do in the wild and luxuriant fields of imagination ?—An able philosopher and philologist shall give the answer : “ Every thing really elegant or sublime in composition is ultimately referable to the principles of sound logic ; those principles, when readers little

think of them, have still a latent force, and may be traced, if sought after, even in the politest of writers. By reasoning of this kind, an important union is established, the union between taste and truth. This is that splendid union which produced the classics of pure antiquity; which produced, in times less remote, the classics of modern days; and which those who now write, ought to cultivate with attention, if they wish to survive in the estimation of posterity. Taste is in fact but a species of inferior truth. It is the truth of elegance, of decoration, and of grace; which, as all truth is similar and congenial, coincides as it were spontaneously with the more severe and logical; but which, whenever destitute of that more solid support, resembles some fair but languid body; a body, specious in feature, but deficient in nerve; a body, where we seek in vain for that natural and just perfection, which arises from the pleasing harmony of strength and beauty associated¹." Though the power of imagination by which the imitative or elegant

¹ Harris's Philosophical Arrangements, p. 458.

arts are produced, called poetic genius, is the gift of nature, and falls to the lot of few, it is governed by general principles and laws which are founded also in nature, and are common to the whole species; and though delicacy of feeling, called taste, which perceives and relishes these beauties, is also in its highest degrees confined to few, it is corrected and improved by reasoning on such general laws or principles. The fine arts, as well as the sciences, are founded on general principles, and it is this which constitutes their truth. The poet who invents, or the critic who judges of these arts, can only carry them to perfection, by conforming to those fundamental principles. Thus the logic of poetry, as well as of philosophy, is of nice and difficult investigation, and they who succeed in it must be possessed of taste and genius as well as of learning. On these subjects both Plato and Aristotle laboured, and the sculptors, and statuaries, and painters of antiquity were doubtless guided by such general rules, though we have not many of such critical works of the ancients. But amongst the moderns we have abundance.—

See Hutcheson on Beauty; Gerard and Burke on Taste; Lord Kaims, Knight, Alison, &c.

Aristotle defines poetic art in general to be “ a habit conducted by reason to the production of a true effect²; and wherever truth is concerned, reason is concerned; particularly where certain causes, whatever they may be, are employed to produce certain effects, and where certain means are adapted to certain ends. Thus there is no part of learning in which reason and judgment have more various employment, or in which they perform a more difficult and delicate task, than in their application to the imitative arts.

When effects are produced upon the internal feeling by objects or events, as they

² “Ἐξίς μετὰ λόγῳ ἀληθῆς ποιητικῆ. ἔστι δὲ τέχνη πᾶσα περὶ γένεσιν, καὶ τὸ τεχνάζειν, καὶ θεωρεῖν, ὅπως ἂν γένηται τι τῶν ἐνδεχομένων καὶ εἶναι, καὶ μὴ εἶναι· καὶ ὧν ἡ ἀρχὴ ἐν τῷ ποιῶντι, ἀλλὰ μὴ ἐν τῷ ποιημένῳ. ἕτε γὰρ τῶν ἐξ ἀνάγκης ὄντων, ἢ γυνομένων, ἢ τέχνη ἐστίν, ἕτε τῶν κατὰ φύσιν· ἐν αὐτοῖς γὰρ ἔχουσι ταῦτα τὴν ἀρχήν. ἐπεὶ δὲ ποιήσεις καὶ πράξεις ἕτερον, ἀνάγκη τὴν τέχνην ποιήσεως, ἀλλ’ ἔπράξεως εἶναι.—ἢ μὲν ἔν τέχνη, ὡσπερ εἴρηται, ἔξις τις μετὰ λόγῳ ἀληθῆς ποιητικῆ ἐστίν· ἢ δ’ ἀτεχνία τῶναντίον μετὰ λόγῳ ψευδῆς ποιητικῆ ἔξις, περὶ τὸ ἐνδεχόμενον ἄλλως ἔχειν.—Ethic. Nicom. lib. vi. cap. 4.

occur in the ordinary course of nature, which is the foundation of poetic imitation, we may perhaps be either too deeply interested in them, or too much involved in their contemplation to speculate on their causes. Yet there are causes, and these rational and intelligent, which are uniform and consistent in their operation, as long as the present system of nature and constitution of the human mind continue permanent. In consequence of this inattention, and other concurrent circumstances,—their frequency, their variety, and complexity, and above all their familiarity—they are not perhaps so distinctly to be ascertained, or so easily generalized, as those which are productive of truth in the province of the will or intellect. They have however in nature a permanent existence, and are more or less recognised and responded to by all, though in a higher degree by sensitive and ingenious minds. The poet or artist remarks these causes as they affect his own feelings, and as he observes their operation on others; and thus from sentiment and observation, he is supplied with a large and various stock of poetical

ideas³. These are the secondary principles of the poetic art. From this valuable treasury, he unconsciously draws the resources of his genius, to be employed in all the different acts of imitation. This operation, however logical it may appear, he does in fact, though it is generally performed by the silent and almost insensible operation of his mind, without the phlegmatic process of a formal logic,—just as many can reason well without knowing the process of reasoning.

But, however insensibly performed, the reasoning may be clearly analyzed; and from thence the truth produced may be critically ascertained⁴.

The truth both of facts and history results

³ Γίγνεται δ' ἐκ τῆς μνήμης ἐμπειρία τοῖς ἀνθρώποις. αἱ γὰρ πολλαὶ μνήμαι τῷ αὐτῷ πράγματι, μιᾷ ἐμπειρίας δύναμιν ἀποτελεῖσσι καὶ δοκεῖ σχεδὸν ἐπισήμη καὶ τέχνη ὅμοιον εἶναι ἢ ἐμπειρία. ἀποβαίνει δ' ἐπισήμη καὶ τέχνη διὰ τῆς ἐμπειρίας τοῖς ἀνθρώποις. ἢ μὲν γὰρ ἐμπειρία τέχνην ἐποίησεν, ὡς φησι Πῶλος, ὀρθῶς λέγων· ἢ δ' ἀπειρία, τύχην. γίνεται δὲ τέχνη, ὅταν ἐκ πολλῶν τῆς ἐμπειρίας ἐννοημάτων καθόλου μία γένηται περὶ τὸν τῶν ὁμοίων ὑπόληψις.—Aristot. Metaph. lib. i. cap. 1.

⁴ See Lowth's Prælect. Academ. v. Omnis natura, immensa hæc rerum universitas, humanæ mentis contemplationi offertur atque objicitur, suppeditatque infinitam notionum varietatem, confusam quandam materiam atque sylvam; imagines, veluti quædam poetica suppellex, colliguntur, &c.

from the apprehension or investigation of particulars, independently of their causes; whereas that of poetry springs from the application of general or universal causes⁵. The first act of reasoning is therefore, from a number of particulars, by collateral judgments of effects produced by them upon the internal feeling, to collect these general causes; and the second, to apply them by the different modes of imitation, in order to produce the poetic effect. Hence poetry is said by Aristotle to be more philosophical than history⁶. Experience forms the foundation, induction is the first act, and a judicious application of generals is the second. And if such general causes of poetic genius be originally well constituted, and afterwards well applied, the poetic truth will display itself in the effect, by a proportionable influence on our sensibility.

Thus poetry stands high in the eye of philosophy. It is founded in abstraction,

⁵ Ἡ μὲν ἐμπειρία τῶν καθέκαστά ἐστι γνῶσις, ἡ δὲ τέχνη τῶν καθόλου.—Aristot. Metaph. lib. i. cap. 1.

⁶ Διὸ καὶ φιλοσοφώτερον καὶ σπουδαιότερον ποίησις ἰστορίας ἐστίν. Ἡ μὲν γὰρ ποίησις μᾶλλον τὰ καθόλου, ἡ δ' ἰστορία τὰ καθ' ἕκαστον λέγει.—Ibid De Poet. cap. 9.

which is the sublimest operation of the mind, by which its ideas are not only generalized, but corrected and improved by an act of intellect, and rendered more perfect and complete than the archetypes themselves. These are the materials with which the imagination works, and which it moulds into forms of beauty superior to any which appear on the face of nature. And hence it is the imitative arts derive that excellence and superiority in which they glory. As by this power of abstraction the mathematician conceives the idea of a perfect circle or a perfect sphere, and the moralist that of a faultless character, which in nature have no external existence ; thus from archetypes which exist in nature, the imitative artist derives ideas so correct and sublime, that they become transcendent, that is, above, though not contrary to natural productions⁷.

Particulars and individuals, with all their deformities and imperfections are indeed often applied by imitation to the production of poetical effect ; but to arrive at the summit

⁷ See Bacon. De Augm. Scient. lib. ii. cap. 13.

of his profession, the artist should employ none but general ideas, with all the advantages which arrangement, disposition, and situation can give them. Thus acted the intelligent statuary, to whose poetical genius the world is indebted for the Venus de Medicis, or the Apollo Belvidere.

But the imitation, by which these poetical ideas are employed in art, according to good taste (which is only another word for correct judgment), is of different kinds, and the just distinction of them forms an act of rational and judicious criticism.

The arts differ according to the different materials and instruments employed, and so does the imitation, which is either direct and proper, or indirect and improper. To discriminate its nature and extent in each of the elegant arts, as well as in the different provinces of the same, is an effort of the most refined philosophy.

In sculpture and in painting, the imitation from the nature of the means and materials they employ is direct and proper, and the resemblance between the statue or picture

and what they represent, is both immediate and obvious. In architecture, the imitation, though of a similar kind, is less direct and proper, and is originally taken from such objects in nature as correspond with its effect. Words are the means or materials of poetry; but words, though as sounds they may sometimes directly resemble sounds, are not the natural representatives of ideas, in which poetry consists; they are only their arbitrary signs, and do not consequently admit of any imitation so proper and direct. That part of poetry, in which the poet personates another, and employs his very words and speeches, is, as far as that personification goes, directly imitative. But with regard to the effects which it produces, poetical imitation is indirect in a greater or less degree. The simplest and least indirect mode of this imitation is that representation of sensible objects which is called poetical description. From this first imitation, poetry advances to a sublimer operation in the representation of mental objects, of the passions, emotions, movements and

sensations of the mind⁸. This it performs in two different ways—either by representing these mental emotions, as they are internally felt, and succeed each other in the mind—or by representing them, as they appear in their sensible and external effects. These less direct modes constitute poetical expression. In all which mental imitations, the

⁸ Porro, ut vehementioribus animæ affectibus originem suam debet poesis, ita in affectibus exprimendis vim suam præcipue exerit, et affectus concitando finem suum optime consequitur.

Imitatione constare dicitur poesis; quicquid humana mens cogitatione complectitur, id omne imitatur: res, loca, imagines vel naturæ vel artis, actiones, mores, affectus: et cum omni imitatione magnopere delectatur mens humana, fieri vix potest, quin illam et delectet maxime et percipiat ea imitatio, quæ ei suam ipsius imaginem exhibet, omnesque eos impulsus, flexiones, perturbationes, motusque secretos exprimit, quos in se agnoscit sentitque. Commendat imprimis hanc imitationem ipsius rei subtilitas et difficultas: habet magnam admirationem, cum cernimus id effectum dari, quod omnino vix effici posse judicamus. Cæterarum rerum descriptiones accuratas esse et naturæ congruere, memoriæ subsidio ac veluti per medium quoddam, mens tardius intelligit: cum exprimitur affectus aliquis, rem ipsam quasi nude intuetur; ipsa per se conscia est et sui et suorum motuum, nec rem perspicit solum, sed et vel idem vel simile quiddam statim patitur. Hinc fit, quod ea sublimitatis species, quæ ex vehementi affectuum impulsu eorumque imitatione oritur, apud animum humanum multo maximam vim habet: quicquid ei extrinsecus exhibetur, utcunque

effect is often extended and enlarged by association of ideas, and wonderfully heightened by sympathy, that lovely and sublime affection, which gives poetry such a powerful ascendant over the heart of man.

Another mode of poetical imitation is that of fiction, which represents facts, characters, actions, manners, and events, in feigned and general story, as history does in real and particular narrative⁹, by adding to the fiction, representation. These more indirect imitations constitute epic and dramatic poetry, into which every other species is introduced.

And to these is to be added another kind of imitation, still more indirect, which conveys the thoughts and ideas of the mind through

grande et magnificum, minus eum, ut par est, commovet, quam quod intus percipit, cujus magnitudinem et impetum et vehementiam, ipse apud se persentit.

Utque imitatio affectuum poeseos perfectissimum est opus, ita per eorundem concitationem maxime ad finem suum et effectum perducitur.—Lowth Poet. Præl. xvii.

⁹ Ἡ μὲν γὰρ ποίησις μᾶλλον τὰ καθόλου, ἢ δ' ἰσορία τὰ καθ' ἕκαστον λέγει.—Ἐπι δὲ καθόλου μὲν, τῷ ποίῳ τὰ ποῦ ἅττα συμβαίνει λέγειν, ἢ πράττειν κατὰ τὸ εἶδος, ἢ τὸ ἀναγκαῖον, ἔσοχάζεται ἢ ποίησις, ὀνόματα ἐπιτιθεμένη· τὰ δὲ καθ' ἕκαστον, τί Ἀλκιβιάδης ἔπραξεν, ἢ τί ἔπαθεν.—Aristot. Poet. cap. 9.

the external objects of sense. Such is parabolical and fabulous poetry¹⁰.

But although the imitations of poetry be less direct and proper than those of the other arts, for this very reason, it surpasses them greatly in its extent and operation on the mind. Poetry, which from this superiority has appropriated the general name, is the mirror of all truth, by which every part of nature, corporeal and mental, is reflected and improved. It is physics, facts, actions, and history feigned at pleasure¹¹, and represented, by the different modes of its imitation, in a language exalted above the common use, and which is peculiarly belonging to itself¹². And thus, whilst it exhibits a beautiful portrait of every species of truth, it softens the labour which attends their acquisition,

¹⁰ At poesis parabolica, inter reliquas eminent, et tanquam res sacra videtur et augusta; cum præsertim religio ipsa ejus opera plerunque utatur, et per eam commercia divinorum cum humanis exercent.—Bacon. De Augm. Scient. lib. ii. cap. 13.

¹¹ Cum nihil aliud sit, quam historiæ imitatio ad placitum.—Bacon. De Augm. Scient. lib. ii. cap. 13.

¹² Poesis est genus doctrinæ verbis plerumque adstrictum, rebus solutum et licentiosum.—Ibid.

Ea est omnis poeseos indoles ut a vulgari sermonis usu

by affording the mind that refined and elegant recreation, which the most rigid philosopher need not blush to enjoy¹³.

Thus poetry, by its imitative and energetic power, presents us with a new creation, every where representative of the old world, springing out of imagination, that sublime inventive faculty which is a compound of will and memory, the former exercising a kind of plastic and creative power on the treasures of the latter. Though imagination can add nothing to the original stock of ideas, with which the mind is furnished by the external and internal senses, or change any of the materials of the old creation; it assumes an absolute command and authority over them, to join, to combine, to mix, to vary, to

maxime abhorreat, atque verborum non solum delectu, sed et constructione proprium quoddam et exquisitius dicendi genus affectet.—Lowth Poet. Præl. iv.

¹³ *Equidem præclare nobis consuluisse videtur natura, quæ cum nos ad veri cognitionem longe a nobis remotam, nec sine magnis laboribus assequendam, vehementer impelleret, hæc nobis invenit et paravit oblectamenta, ut haberet mens nostra, quo defatigata identidem confugeret; ubi conquirere, omnemque illum languorem et molestiam deponeret.*—Lowth Poet. Præl. 1.

compound, or dispose them, in every different form and representation of description, fiction, personification, vision, or allusion. And if the wild and inventive genius of our own countryman were not instructed in the cold philosophy of poetry, his warm and inventive fancy was susceptible of its finest influence. From the following animated picture, which he has given of his profession, one might suppose that he was not entirely unacquainted with the *rationale* of the art :

The poet's eye in a fine frenzy rolling,
Doth glance from heav'n to earth, from earth to heav'n ;
And as imagination bodies forth
The forms of things unknown, the poet's pen
Turns them to shape, and gives to airy nothing,
A local habitation and a name¹⁴.

In the higher departments of the muse, poetry feigns actions and events succeeding each other in due order, giving them the life and animation of persons of the first distinction, with the consistencies of time and place, and every other circumstance of probable history, consulting the gratification of all the

¹⁴ Shakspeare's *Midsum. Night's Dream*, Act i. Sc. 1.

sublimer sentiments and affections of the mind, and perfecting the whole plan into the resemblance of a more complete, more beautiful, more engaging, and more instructive truth¹⁵. Such is the power of imitation, the universal instrument which genius employs, though generally unconsciously, in producing those marvellous effects, which from the days of Homer to the present times have instructed and delighted mankind.

In the choice and adoption of the means

¹⁵ Ea a fundamento prorsus nobili excitata videtur, quod ad dignitatem humanæ naturæ imprimis spectat. Cum enim mundus sensibilis sit animâ rationali dignitate inferior, videtur poesis hæc humanæ naturæ largiri, quæ historia denegat; atque animo umbris rerum utcunque satisfacere, cum solida haberi non possint. Si quis enim rem acutius introspectat, firmum ex poesi sumitur argumentum, magnitudinem rerum magis illustrem, ordinem magis perfectum, et varietatem magis pulchram, animæ humanæ complacere, quam in natura ipsa post lapsum, reperire ullo modo possit. Quapropter, cum res gestæ et eventus, qui veræ historiæ subjiciuntur, non sint ejus amplitudinis, in qua anima humana sibi satisfaciat, præsto est Poesis, quæ facta magis heroica confingat. Cum historia vera successus rerum, minime pro meritis virtutum et scelerum, narret; corrigat eam poesis, et exitus et fortunas, secundum merita et ex lege Nemeseos, exhibet. Cum historia vera, obvia rerum satietate et similitudine, animæ humanæ fastidio sit; reficit eam poesis inexpectata, et varia, et vicissitudinum plena canens.—Bacon. De Augm. Scient. lib. ii. cap. 13.

requisite to the accomplishment of so complete an end, in their poetical execution, and in conducting the whole to the best effect, the judgment performs a very delicate and difficult task. Fancy may be luxuriant, and genius prolific; but reason, however silently and imperceptibly she may work, has to prepare and correct the natural fertility of the soil, and to assist in nourishing the production, till it ripens into its full maturity. It has to adjust the propriety of the inventions, to rectify the falsities of taste, to arrange the order and succession of the parts, and unite them into one consistent whole: an exercise of philosophy which forms a very deep and recondite branch of learning, pre-eminently called criticism, or the philosophy of judgment.

This part of philosophy did not escape the inquisitive attention of Aristotle, whose strong and comprehensive mind was not only the repository of all the learning of his age, but the author and improver of many of its departments. His penetrating eye could not view those admirable models of poetic art,

exhibited in the drama of Sophocles, or in the epos of Homer, and contemplate the effects which they produced on the mind and the different affections of pleasure and pain, without inquiring into the causes which conspired, in such exact and admirable combination to their production. In this arduous investigation, he analyzed these compositions, and reduced them to their simplest parts and principles. By this method he discovered their artifice and machinery, how every part was formed, how one operated on another, and how they all co-operated in the formation of a perfect whole. Thus the inventive and poetical genius of Homer and Sophocles or Euripides produced the most admirable specimens of the art, whilst the analytic and philosophical genius of Aristotle discovered the logic or *rationale* of the originals.

In this philosophical analysis, all the parts and connexions, the beauties and proprieties, the unities and consistencies, which are assembled, combined, and executed by the exertion of the sublimest and most judicious imagination, are explained in the clearest and most didactic manner, and with so much

soundness and discrimination of judgment, that the criticism itself became a model on which to form the plan of the future poet, as well as the standard to direct the decision of the future critic.

But though many important advantages have been derived both to the works of the poet and the judgment of the critic, from this incomparable production of Aristotle; yet, in many instances, the genius of the one has been checked in its native vigour, and the judgment of the other warped and contracted, by an application too severe and unqualified of what at best can form only a partial rule.—The materials of nature are extensive as the universe.

Genius is the produce of every soil, the growth of every age and country. In its boundless application to poetry, it catches facts, characters, and manners as they rise; and by a just and lively imitation, produces the effect upon the minds of those who were witnesses of the scenes, and who are best qualified to recognise and respond to its poetical creation. If these facts, characters, and manners, which form the genuine re-

sources of the muse, are known to change with the change of time and place ; if from the temperature of climate, the influence of politics, the prevalence of civil and religious opinions, or the dominion of fashion ; if from some causes which we know, and far more we do not know, the scene of human life and manners be shifted with every age and country—the poetical model, formed by Aristotle from the works of Sophocles and Homer, however perfect as far as it extends, is constructed on a scale too narrow and confined to form the universal law of poetical composition. However adapted to the manners and sentiments of ancient Greece, however admirable in itself, as holding out a picture of the dignity and simplicity of the classic ages, and though incomparable as a specimen of the most refined and polished taste,—the Poetics of Aristotle, or the Art of Poetry of Horace, should be considered, only as a general and imperfect guide, to be applied with much caution and reserve, and with particular attention to the changes in the circumstances of time and place.

Poetical imitations are always the most

perfect, the most proper, the most effective, when they are taken directly from things that are ; when the poet's feelings are themselves excited, his genius enlivened, and his imagination warmed by present objects whatever they may be : and not when they are imitations of things that were, as presented to the feelings, and represented by the imagination of Sophocles or Homer, and copied from their works. This is but the imitation of an imitation, and can at best be only like an excellent copy of a Titian or Vandyck. However perfect the model, there is a coldness and languor inseparable from this secondary imitation, which must ever repress the native fire of the poet, and sink him into a disgraceful inferiority.

True poetic genius in these later ages has never glowed with such force and brilliancy, as in the works of Spenser and Shakspeare, Dante and Ariosto, who were unacquainted with the ancient rules ; or as in that of Milton, whose immortal poem did not admit of their application. And could another Aristotle arise to analyze the works of these more modern bards, we should receive a new

code of poetical laws, superior in some respects, however inferior in others.

Thus instead of improving the judgment and correcting the taste, too implicit a devotion for the critique of Aristotle, and too partial a reverence for the specimens of antiquity, have tended to cramp the poet's genius, to pervert the judgment of the critic, and abridge the privilege of the art.

From the same narrow prejudice and superstitious veneration of antiquity, architecture has run the same or similar fortune. The Grecian orders are most inimitable in their proportions, unequalled in their ornaments, and unparalleled in the richness and beauty of their sculpture. The models of the ancient temples are among the most splendid monuments of human genius. But these orders, however excellent, are not adapted to all countries, to all climates, or to all materials; nor are these models accommodated to many of the uses and purposes of modern life. Whilst we reverence these remains of classical antiquity, we should not so far suffer ourselves to be blinded by that reverence, as to neglect and disregard that

other species of architecture, of which we have many admirable specimens peculiar to our country, which, however inferior in its materials and ornaments, is more various and extensive in its expression, more adapted to the climate, and better calculated for many purposes of the country in which we live¹⁶.

Thus the regions of imagination, however fertile and luxuriant, require the aid of reason to improve their various soils, and to cultivate them to the best advantage, that the fruits which they severally produce, may neither be so exuberant in their growth, as never to reach perfection, nor so hasty in their progress, as to ripen prematurely; but that duly and regularly matured by their native strength and vigour, assisted by the friendly visitation of the elements, they may become nutritious to the moral constitution, as well as pleasant and delicious to the taste.

¹⁶ One loss, out of many, which has been sustained by the death of Mr. Thomas Warton, is that of his intended History of Gothic Architecture, which is much to be regretted, as a great desideratum.

SECT. IV.

Poetical Truth.

IF we compare the truth resulting from poetical imitation, with the several kinds which have been the subject of the preceding pages, we shall find, that in several of its departments, and those the most sublime and perfect, as belonging to the highest genius under the guidance of the purest taste and judgment, it must be acknowledged to be altogether fictitious. Poets enjoy the privilege, with the consent of their father-critic, to be egregious falsifiers¹: and their images are called, by one who was himself the first of poets, “airy nothings.” But, however airy and unsubstantial the art may be, considered in its inventions, fictions, and allusions, it may be true in its imitations of nature; and

¹ Κατὰ τὴν παροιμίαν, πολλὰ ψεύδονται ἄοιδοί.—Aristot. *Metaph.* lib. i. cap. 2.

if the imitation be true or the resemblance which it exhibits just, it will produce a certain and uniform *effect* (it can scarce be called conviction) on the human mind. It is this effect which constitutes poetical truth, and this truth, in all its variety, and which forms the most delicious food, and has been ever found the most useful and agreeable medium through which many other kinds of truth may be insinuated and conveyed.

When descriptive poetry exhibits merely a picture of external objects, or internal emotions, either as immediately felt, or in their sensible effects, it is a representation of things as they really are. It is then but a short remove from historical truth, and we know that historians frequently enliven the narrative of real facts, with all the embellishment of poetical description. But poetry, as an art, neglects in its higher exercise the reality of such representations; considering the effect they are able to produce on the imagination, rather than the conviction they work on the understanding. It therefore exhibits things as they might be, not as they really are, and evermore delights

in fiction². It feigns characters, circumstances, situations, and actions, and often heightens the fiction by personification, and improves the whole picture by exhibiting it under the veil of a wild and metaphorical diction. If the characters be such as are capable of a real existence, if the sentiments would naturally arise in the circumstances described, if the actions are those which might be expected in real life, and the language attributed to the characters such as if they had really existed; the whole may be a grand and interesting fiction and illusion on the understanding, but such an illusion as the mind willingly indulges for the sake of the *effect*. In this effect, consists that poetical truth in which Apollo and the Muses delight to converse.

Poetry is therefore, first, descriptive, or a picturesque imitation of material and mental objects. Secondly, narrative or epic, which presents an imitation of facts and actions in

² Οὐ τὸ τὰ γινόμενα λέγειν, τῶτο ποιητῆ ἔργον ἐστίν, ἀλλ' οἷα ἂν γένοιτο, καὶ τὰ δυνατὰ κατὰ τὸ εἰκὸς, ἢ τὸ ἀναγκαῖον.—Aristot. De Poet. cap. ix.

historical succession. Thirdly, dramatic, which gives to portions of feigned history the addition of personal representation; and, fourthly, parabolical, which couches mental objects under types, emblems, fables, and actions³; and which, through the most elegant vehicle of instruction, conveys theoretic, moral, or theologic truth⁴.

Mind, the universal cause of all things, is the energy of God, exerted in the creation of the various and stupendous works material and mental, which replenish and adorn the universe. Mind, operating in poetic art, and imitating in its sublimer acts all external

³ *Partitio poeseos verissima, atque maxime ex proprietate, præter illas divisiones, quæ sunt ei cum historia communes (sunt enim ficta chronica, vitæ fictæ, fictæ etiam relationes), ea est, ut sit aut narrativa, aut dramatica, aut parabolica. Narrativa prorsus historiam imitatur, ut fere fallat, nisi quod res extollat sæpius supra fidem. Dramatica est veluti historia spectabilis; nam constituit imaginem rerum tanquam præsentium; historia autem tanquam præteritarum. Parabolica vero est historia cum typo, quæ intellectualia deducit ad sensum.—Bacon. De Augm. lib. ii. cap. 13.*

⁴ *Alter est usus poeseos parabolicæ, priori quasi contrarius, qui facit (ut diximus) ad involucrem; earum nempe rerum, quarum dignitas tanquam velo quodam discreta esse mereatur: hoc est, cum occulta et mysteria religionis, politicæ, et philosophiæ, fabulis et parabolis vestiuntur.—Ibid. lib. ii. cap. 13.*

productions and mental operations, and giving them a more general, more perfect, and instructive form, is the energy of man. Whilst other parts of learning are usefully and honourably employed in exploring the works, or searching into the will of God, it is the high privilege of poetry to emulate his acts, and thus to raise and sublime the affections towards the imitation of his goodness, the adoration of his wisdom, and the admiration of his power. It is the end of poetry, not merely to delight and entertain the imagination, but to enlarge the understanding, to raise the genius, and purify the heart. Thus it may be truly said, as its votaries have often supposed, to partake in some measure of divinity. It raises the mind above its natural condition, by accommodating its images to its desires; and not like philosophy and history, by submitting the mind to the present fallen nature of things⁵.

⁵ Adeo ut poesis, non solum ad delectationem, sed etiam ad animi magnitudinem, et ad mores conferat. Quare et merito etiam divinitatis cujuspian particeps videri possit; quia animum erigit et in sublime rapit; rerum simulacra ad animi desideria accommodando, non animum rebus (quod ratio facit, et historia) submitiendo.—Ibid. lib. ii. cap. 13.

Should we pursue this subject, I might enlarge upon the various and interesting effects of poetry or poetic truth, and relieve the dryness which is inseparable from philosophic discussion, by a more pleasing and popular mode of writing. But the plan which I have proposed calls my attention to other topics.—“ Let none, however, from the vicious and profane example of some, who pervert the best of things to the worst of uses, vilify and degrade this most honourable art. Let none despise as futile, condemn as insignificant, or impeach as impious, a faculty bestowed on man for the most sublime and sacred purposes, consecrated to the most august offices of religion, and sanctioned by the authority and example of God himself⁶.

⁶ Desinant itaque ex quorundam hominum vitio, qui rebus optimis pessime abutuntur, honestissimæ facultati invidiam conflare: desinant eam artem, ut in se levem futilemque contemnere, ut profanam atque etiam impiam criminari, quam in sanctimos usus Dei ipsius munere hominibus concessam fuisse videmus, Deique ipsius auctoritate atque exemplo augustissimis ministeriis consecratam. — Lowth. Poet. Præl. ii.

CHAP. VIII.

MUSIC.

ALTHOUGH much criticism and philosophy have been employed on this most elegant and fascinating art since the age of Aristotle, yet are these criticisms, for the most part, unphilosophic and superficial. The *rationale* of music seems to be more complicated and involved in mystery, and more difficult to be analysed¹, than that of almost any other art or science.

Music is akin to poetry, and has accordingly been its faithful and constant companion in every age and country. It is a compound of motion and sound, and so far as the mensuration and proportion of the former is concerned in producing its effect,

¹ Οὔτε γὰρ τίνα ἔχει δύναμιν ῥάδιον περὶ αὐτῆς διελεῖν, ὅτε τίνοσ δέῃ χάριν μετέχειν αὐτῆς.—Aristot. De Repub. lib. viii. cap. 5.

it may be considered a geometrical science, and allied to mechanics and astronomy². Its melodies and harmonies may thus, indeed, be scientifically measured and constructed by mathematics; yet all the mathematics in the world will never make a good musician. Besides the mensuration of motion, which is called *time*, all the varieties of sound or different tones, with their simple successions, called *melody*, and their complex successions, called *harmony*, constitute the other part of the compound of which music consists. But these, however they may be measured or regulated by time or motion, are in themselves essentially distinct from both.

Music, however compounded, terminates, therefore, neither in speculation or action, but in effect and expression. Like poetry and all other elegant arts, it derives its energy from the principle of imitation³, and represents the different passions and emo-

² Σχεδὸν δὲ συνώνυμοί εἰσι τούτων τῶν ἐπισημῶν ἔναι, οἶον, ἀερολογία, ἢ τε μαθηματικὴ, καὶ ἡ ναυτικὴ, καὶ ἀρμονικὴ, ἢ τε μαθηματικὴ, καὶ ἡ κατὰ τὴν ἀκοήν.—Ibid. Analyt. Post. lib. i. cap. 13.

³ See De Poet. cap. i.

tions of mind⁴, by means of its rythms and the order and succession of its sounds⁵. It may be considered as a species of inarticulate poetry, addressed to the ear, and operating by tones and vibrations on our passions and affections. Hence the term *musical expression*.

As its organ is the ear, the means and materials of its imitation must essentially differ from those of figure or colour. It differs more from sculpture, painting, or architecture, both in its composition and effect, than either of these from each other. Though the means or materials of music be confined to sound and motion, yet so various and indefinite are the degrees and varieties of their combination, that the capabilities of musical imitation are inexhaustible, and its effect on the mind indefinite and ever varying.

And this it is, I apprehend, which causes the difficulty of philosophically analysing

⁴ Ἐπι δ' ὁμοιώματα μάλιστα παρὰ τὰς ἀληθινὰς φύσεις ἐν τοῖς ῥυθμοῖς καὶ τοῖς μέλεσιν ὀργῆς καὶ πραότητος· ἔτι δ' ἀνδρίας καὶ σωφροσύνης, καὶ πάντων τῶν ἐναντίων τέτοις, καὶ τῶν ἄλλων ἡθικῶν.—Ibid. De Repub. lib. viii. cap. 5.

See the latter end of the chapter—Ἐκ μὲν ἔν τετῶν φανερόν, ὅτι δύναται ποῖόν τι τὸ τῆς ψυχῆς ἡθους ἢ μουσικῆ παρασκευάζειν.

⁵ Ἐν δὲ τοῖς ῥυθμοῖς. καὶ ἐν τῇ τῶν φθογγῶν ταξει.—Aristot. De Musicâ, sect. xix. prob. 27.

musical composition. The musical composer, who is possessed of native sensibility, discovers involuntarily what strain of sound and motion will affect that sensibility, and varies his notes accordingly, and will always excel in that particular style which accords with the bent of his genius and specific sensibility. The value of his compositions must depend on the dignity of the style, and the effect it is calculated to produce, combined with the excellence of the execution. But one great injury to which this fascinating art is exposed, arises from the performers, whether vocal or instrumental, overacting their parts in the execution, by which the effect on the passions and affections is much diminished and obstructed.

Music claims the privilege of being at once a science and an art. It is a science, as being founded on the principles of geometrical proportion—and it is then styled Harmonics. As an art, it is allied to poetry, and its effects on the passions and affections are extremely similar. The fascinations of its art are derived from the powers of imagination, corrected by good taste and judgment.

Music is therefore a compound of sound

and motion. Sounds are either voices or tones, and these divide music into vocal and instrumental. Vocal sounds, as the elements of music, are simple and compound, long or short, articulate or inarticulate. Tones and instrumental sounds admit of the same division, but are never articulate. Music is divided generally into melody and harmony. The former consists of single sounds following each other in regular succession, called modulation. When they rise to combinations, well proportioned, they constitute harmony. Motion in music admits of as many divisions and subdivisions as sound.

The effect of music on the human frame is truly wonderful, and in its philosophical analysis, it should, I think, be considered as a compound of art and science; which complex view might probably facilitate the knowledge of the *rationale* of its powers and mode of operation, and help us to ascertain with precision the specific nature of its imitation, which varies in every art, being more immediate or distant, more direct or indirect, according to the different means which they respectively employ.

With these few hints to the student of music, should he think them worth his observation, we conclude this general allusion to this most fascinating art and curious science⁶.

⁶ Consult Du Bos on Poetry, Painting, and Music; Harris's Three Treatises; Avison on Musical Expression, &c. &c. For the theory of harmonics, the reader is referred to Dr. Smith, Rameau, Burney's History of Music, Rousseau's Musical Dictionary, the article Music in the Encyclopædia Britannica, &c. For the ancients, he may consult the collection *Antiquæ Musicæ Scriptores*, published by Meibomius, 1652; and Ptolemy's *Harmonics*, edited by Wallis, Oxon, 1682.—*Editor*.

RECAPITULATION.

IN this volume, I have attempted to draw a compendious analytical Chart or graphical delineation of Mathematics, Physics, Metaphysics, Facts, History, Morality, Poetry, and Music, according to the relation which they respectively bear to the three general faculties of the human mind,—the Intellect, the Will, and the Imagination. From their connexion with each other, and the synopsis of the whole, we have endeavoured to form a kind of general scale, by which the truth of each may be compared and graduated.

As a ray of the sun, that sublime and significant emblem of truth, passing through a prism, is divided into a beautiful variety of shades and colours; so that ray of truth, which is shed down from heaven on the human mind, as it passes through these different channels of knowledge, differs in

strength and degree, exhibiting an illustrious specimen of that beauty and variety of appearance and effect, which, in every part of creation, distinguish the works of God.

Upon this philosophical view of man, a question may arise in the minds of some—Why does that truth, which in the Divine Mind is equally clear in all its parts, and which is given by his omniscient will for the guide and conduct of life, shine upon the human, with such different degrees of force?—

Ask of thy mother earth, why oaks are made
Taller and stronger than the weeds they shade?
Or ask of yonder argent fields above,
Why Jove's satellites are less than Jove?—

POPE'S Essay on Man.

As all things were created in the purest goodness, they are appointed in the profoundest wisdom. Whilst the bulk and majesty of the oak may command our immediate notice and admiration, the humble vegetable under its shade, though difficult to be found and despicable to the eye, may possess those superior qualities, which, for food or medicine, may contribute more

essentially to the use and happiness of man. It is enough for the benefit of the receiver or the honour of the giver, that truth is dispensed in that exact proportion, and with those especial qualifications, which are best adapted to our use and happiness; and though man, as he travels along his sublunary way, may be permitted only to see some of its sublimer parts, as “through a glass darkly,”—yet if he labours to find it out with diligence and desire, he may still lift up his voice in praise—“Thy truth, most mighty Lord, is on every side!”

In the execution of the plan proposed, we now proceed to the logical delineation of theologic truth, which will form the subject of the ensuing volume.

APPENDIX.

APPENDIX I.

THE ARISTOTELIAN LOGIC¹.

IT has been already observed, that the two highest species of poetry, the dramatic and the epic, particularly the former, were analysed by Aristotle in his treatise of Poetics, in a minute and philosophical investigation of their parts and principles, and the causes of their effect on the imagination. This treatise and that of his Rhetoric are generally and justly allowed to be two of the ablest works of that deep philosopher; which, by the originality and critical acumen they discover, have conferred upon him the title of the father of critics, as Homer is called the father of poets, and Demosthenes the prince of orators.

Those who have best understood and most ardently admired the works of the Peripatetic, seem unanimously to agree, that these two admirable works of criticism could not have originated abstractedly, that they could not spring from any

¹ On this general subject, consult Dugald Stewart's Elements, vol. ii. chap. 3, 4; Reid's Analysis of Aristotle's Logic; Brown's Philosophy of the Human Mind, lecture 50, &c.; Campbell's Philosophy of Rhetoric, &c. &c.—*Editor.*

effort of his own judgment or invention previously exercised, independently of the productions of the orator or poet ; but that the one is the analysis or dissection of the drama of Sophocles or Euripides, and of the immortal and unrivalled Iliad of Homer, whilst the other is the analysis or dissection of the orations of Demosthenes and the most celebrated Grecian orators. They accordingly both consist of a philosophical investigation of the causes which conspire to the various and wonderful effects, produced on the mind and feelings, by these splendid monuments of genius and invention.

To suppose *that* to have been originally and necessarily produced by art and philosophy, on which, when produced, art and philosophy have been successfully employed, is an error in the history of learning, which has been too commonly entertained. These admirable productions first sprang from the spontaneous operation of the genius, or from the native strength of the judgment of the orator or the poet. From this analysis, art and philosophy extracted rules to direct the genius of future poets or orators, and to assist the judgment of future critics. “Aristotle, we know,” says the author of *Philosophical Inquiries*, “did not form Homer, Sophocles, and Euripides ; it was rather Homer, Sophocles, and Euripides which formed Aristotle.”² And this

² Harris’s *Phil. Inq.* p. 231.

strenuous admirer and interpreter of the philosopher who first exhibited the mechanism and construction of poetry and oratory, has with much ingenuity developed the mechanism and construction of his original criticism. "As the great events of nature led mankind to admiration, so curiosity to learn the cause whence such events should rise, was that, which by due degrees formed natural philosophy. What happened in the natural world, happened also in the literary. Exquisite productions, both in prose and verse, induced men here likewise to seek the cause; and such inquiries, often repeated, gave birth to philology. Those who can imagine, that the rules of writing were first established, and that men wrote in conformity to them, as they make conserves and comfits by receipt books, know nothing of criticism, either as to its origin or progress. The truth is, they were authors who made the first good critics, and not critics who made good authors, however writers may have profited by critical precepts. Ancient Greece, in its happier days, was the seat of liberty, of sciences, and of arts. In this fair region, fertile of wit, the epic writers came first; then the lyric, then the tragic; and lastly the historians, the comic writers, and the orators, each in their turns delighting whole multitudes, and commanding the attention and admiration of all. Now, when wise and thinking men, the subtle investigators of principles and causes, observed the wonderful effect of these works upon the

human mind, they were prompted to inquire, whence this should proceed; for that it should happen merely by chance, they could not well believe. Here therefore we have the rise and origin of criticism, which, in its beginning, was a deep and philosophical search into the primary laws and elements of good writing, as far as they could be collected from the most approved performances. Much of this kind may be found in the different parts of Plato; but Aristotle his disciple, who may be called the systematizer of his master's doctrines, has in his two treatises of Poetry and Rhetoric, with such wonderful penetration, developed every part of the subject, that he may be justly called the father of criticism, both from the age when he lived, and from his truly transcendent genius. The criticism which this capital writer taught, has so intimate a correspondence with philosophy, that we can call it by no other name than that of Philosophical criticism³."

This acute reasoning of our late philologist, by which he so philosophically accounts for the origin of the Poetics and Rhetoric of the Stagirite, I would now extend to his books of Interpretation, and the Analytics. We assert they contain a deep and philosophical search into the primary laws and elements of demonstrative reasoning, as far as they could be collected from the most approved performances in his time. That this is in

³ Harris's Phil. Inq. p. 2—9.

fact the case, no one who is sufficiently acquainted with these works will, I think, deny. In support however of this position, I shall avail myself of the opinion and authority of another of the Peripatetic's ardent admirers, who has informed us, "that the discovery of the nature of truth does not seem to have been made, at least by the philosophers of Greece, till Aristotle wrote his book of Analytics, the professed design of which is to show what science and demonstrative truth is⁴."

This is the inference then, which I have to draw from the comparative view of the works of Aristotle—that as the Poetics contain the philosophy or *rationale* of two species of poetry, or the Rhetoric the philosophy or *rationale* of oratory, and record the laws and rules by which the most successful productions in both these departments were constructed ; so may we conclude, by strict analogy, that the Analytics of the same author is the philosophy or *rationale* of demonstration, investigating its principles, and delivering the laws and rules by which it has been conducted, or may be advantageously continued. And thus, if what is advanced in these lectures in reference to the kinds of truth, their different principles, reasoning, and constitution, be at all well founded, this part of his Organon is no more calculated to supply the rule or art, by which reason can push on her in-

⁴ Anc. Metaph. vol. i. p. 374.

quiries in physics, ethics, or any other branch of learning from which demonstration is excluded, than his Rhetoric is the rule or art of writing a poem, or his Poetic the rule or art of composing an oration; or than the plan of a bridge can exhibit the rule or art of building a church, or any other study in nature become the rule or art of producing an effect to which it does not properly belong.

Syllogism forms professedly the whole scope and burden of this celebrated work; which, as may be expected from this view of its origin, is peculiarly adapted, if not almost exclusively confined, to that species of reasoning which is properly demonstrative⁵. Though the Prior Analytics affect to treat

⁵ See chap. iv. sect. 2, and chap. vii. sect. 2.

In his First Analytics, where he delivers the doctrine of syllogism in general, Aristotle divides it into three classes, which he calls figures, according to the predication and subjection of the middle term. Each of these figures he subdivides into a certain number of legitimate modes, according to the quantity and quality of the premises. And this forms the whole plan of his logic. The first of these figures is however not only the first, but the most important, and involves all the value of the other two; for all their legitimate modes, as well as those of a fourth, invented afterwards by Galen, are reducible to some of the modes of the first figure, and derive their proof and authority from that reduction. See *Analyt. Prior.* cap. 23, 24. Now, the reasoning in the first figure is absolutely demonstrative, and Aristotle observes, that all mathematical reasoning is reducible to syllogisms of the first figure. *Τῶν δὲ σχημάτων ἐπισημονικὸν μάλιστα τὸ πρῶτον ἐστίν. Αἴ τε γὰρ μαθηματικαὶ τῶν ἐπισημῶν διὰ τούτου*

of probable and sophistical, as well as of necessary or demonstrative syllogisms; it is the last only whose principles are accurately and successfully analyzed. These are exhibited in the Posterior Analytics, with such force of genius and labour of investigation, as spring from an indestructible foundation, and erect an immense system of abstract and general truth, fortified by demonstration, and rising, from story to story into a most luminous and lofty fabric.

But although his Poetics, whatever might be the expectation of the Stagirite, were never able

φέρουσι τὰς ἀποδείξεις, οἷον ἀριθμητικῆ, καὶ γεωμετρία, καὶ ὀπτικῆ, καὶ σχεδὸν [ὡς εἰπεῖν] ὅσαι τῷ διότι ποιῶνται τὴν σκέψιν. ἢ γὰρ ὅλως, ἢ ὡς ἐπὶ τὸ πολὺ, καὶ ἐν τοῖς πλείστοις, διὰ τοῦτου τῷ σχήματος ὁ τῷ διότι γινέται συλλογισμὸς.

"Ὡσε κἂν διὰ τῶν εἴη μάλιστα ἐπισημονικόν. κυριώτατον γὰρ τῷ εἰδέναι, τὸ διότι θεωρεῖν. Εἶτα τὴν τῷ τί ἐστιν ἐπισημὴν, διὰ τήτου μόνου θηρεῦσαι δυνατόν. ἐν μὲν γὰρ τῷ μέσῳ σχήματι ἂ γινέται κατηγορικὸς συλλογισμὸς· ἢ δὲ τῷ τί ἐστιν ἐπισημὴ, καταφάσεως. ἐν δὲ τῷ ἐσχάτῳ γίνεται μὲν, ἀλλ' ἂ καθόλου· τὸ δὲ τί ἐστι, τῶν καθόλου ἐστιν· ἂ γὰρ πῆ ἐστι ζῶον δίπουν ὁ ἄνθρωπος. "Ἐτι τῷτο μὲν ἐκείνων οὐδὲν προσδεῖται· ἐκεῖνα δὲ διὰ τούτου καταπυκνῶνται, καὶ αὐξεται, ἕως ἂν εἰς τὰ ἄμεσα ἔλθῃ. Φανερόν οἶν, ὅτι κυριώτατον τῷ ἐπίσασθαι τὸ πρῶτόν ἐστι σχῆμα.—Analyt. Post. lib. i.

We can here plainly discover the intimate and indeed necessary connexion between syllogism and demonstration, both of which he had extracted from mathematics. This is still further evident from the third chapter of the sixth book of the Nichomachian Ethics, where he introduces the syllogism, after speaking of mathematical science. See also his examples in the two subsequent chapters.

to make a poet, or his Rhetoric, however excellent its criticism, an orator, without that native force of genius and vigour of imagination, the first and indispensable ingredients, which they may doubtless correct and improve, but never can supply—he resolved, with a bold and enterprising mind, though on weaker grounds of expectation, that the syllogism, which he had constructed with so much labour on so firm a basis, should form a universal reasoner, and conduct him with facility and success, in the search and illustration of probable truth, throughout all parts of science⁶.

His sagacity soon discovered, that axioms or maxims, which are general propositions from which the media or arguments are to be drawn, must in the first place be formed as they are in mathematics, before syllogistic reasoning could be applied, as the guide to truth, in any of the departments of probable knowledge. In the analysis of demonstrative reasoning, he had beheld the wonderful and immediate effect, which the universal form or category of quantity possessed in the production of axioms or self-evident truths, as the principles of syllogistic argument; and he cherished the hope, (and when great minds are too sanguine, whilst their labours are entitled to our gratitude, their mistaken zeal bespeaks our pardon), that the other nine would furnish axioms with

⁶ Ἡ μὲν πρόθεσις τῆς πραγματείας, μέθοδον εὐρεῖν, ἀφ' ἧς δυνατόμεθα συλλογίζεσθαι περὶ παντὸς τῷ προτεθέντος προελήματος, ἐξ ἐνδόξων.—Aristot. Top. lib. i. cap. 1.

almost equal ease, from which men might reason syllogistically on every possible question, and which they might apply in proof and elucidation of every kind of knowledge⁷.

He therefore took the ten categories, or universal forms, from the Pythagorean school, where they had been held almost in adoration as the grand umpires of all knowledge, and prefixed them to his *Organon*, that they might supply axioms of every kind, as the laws and principles of all probable or dialectic, as well as of demonstrative reasoning. And to complete this great design, at the end of the *Analytics*, he added his book of *Topics*, wherein he delivers the methods, in which these general propositions are to be formed at pleasure from the categories, enumerating and distributing them into certain heads, according to the five predicables, and assigning them as the general principles of argumentation on every subject⁸. To these general principles thus easily procured, he applied the dialectic syllogism, which included, in his idea, every species of reasoning, according to

⁷ *Ardua est et gravis doctrina categoriarum, magnique usus et momenti, non ad logicam tantum, sed et metaphysicam, omnesque philosophiæ partes, quæ de ente universim, vel de partibus entis disserunt; sunt enim categoriæ veluti quædam familiæ, classes et ordines entis, seu compendia rerum omnium, certa ratione dispositarum, unde disserendi amplissima materies petitur et ipsa scientiarum objecta tanquam è locupletissimo penu depromuntur.*—Du Val. *Synop. in Aristot.* p. 58.

⁸ See *Aristot. Top. lib. i. cap. 9, 10.*

all the modes and figures, in which in his *Analytics*, he had with so much labour and ingenuity displayed the demonstrative.

Thus by a lofty and magnanimous flight of genius, at an early period of the world and in the infancy of science, Aristotle erected a fabric of universal reasoning; and as its governor, enacted the laws of disputation⁹, according to which all its various artillery was to be levelled and discharged. By the addition of his book of *Sophisms*, he rounded the whole into a system of logic¹⁰, or rather disputation, which stood for many ages the arbiter of all learning, and became the boast and idol of the schools. Of such ancient and illustrious seminaries it still continues to rule the discipline.

⁹ See *Aristot. Top. lib. viii.*

¹⁰ "To attempt, in so early a period, a methodical delineation of the vast region of human knowledge, actual and possible; and to point out the limits of every district, was indeed magnanimous in a high degree, and deserves our admiration, while we lament that the human powers are unequal to so bold a flight."—*Dr. Reid App. to Ld. Kaims's 3d vol. of Sketches, p. 330.*

In the conclusion of his book of *Sophistical Elenchs*, in which he finishes the whole *Organon*, which taken together must be allowed, notwithstanding its defects, to form one of the greatest monuments of human reason produced by one man, Aristotle apologizes for the errors of such an undertaking, which was entirely new and unattempted by any before himself. "Although the art of categorical syllogism," says *Dr. Reid*, "is better fitted for scholastic litigation, than for real improvement in knowledge, it is a venerable piece of antiquity and a mighty effort of human genius. We admire

As in exploring the depths and recesses of the earth for those treasures which are buried under its surface, and producing them to the use of man ; so in discovering those truths which are hidden in similar obscurity on every side, and conveying them to our information, much depends upon the method and direction—that is, the kind of logic which we pursue.

It was fatal to the discipline of the schools, whose main object should have been the discovery and communication of universal truth, and which should train up the mind in the right method of science,—that the topical part of the *Organon* of Aristotle (which affects to be of more importance and extent than the analytical, as establishing the principles of all the parts of learning excepting the demonstrative¹¹, enacting the laws of all

the pyramids of Egypt, and the wall of China, though useless burdens upon the earth. We can bear the most minute description of them, and travel hundreds of leagues to see them. If any person should with sacrilegious hands destroy or deface them, his memory would be held in abhorrence. The predicaments and predicables, the rules of syllogism, and the topics, have a like title to our veneration, as antiquities ; they are uncommon efforts, not of human power, but of human genius ; and they form a remarkable era in the progress of human reason.”—*Ibid.* p. 420.

¹¹ Χρήσιμος πρὸς τὰ πρῶτα τῶν περὶ ἐκάστην ἐπισήμην ἀρχῶν.—τῆτο δ' ἴδιον ἢ μάλιτα οἰκείον τῆς διαλεκτικῆς ἐστίν. ἐξετασικὴ γὰρ ἔσται, πρὸς τὰς ἀπασῶν τῶν μεθούδων ἀρχὰς ὁδὸν ἔχει.—*Top. lib. i. cap. 2.*

probable reasoning¹², and guarding that reasoning from all possible error¹³), is weak in its foundation, and consequently, defective in all its parts. Here, we behold the great Peripatetic, falling, from the strength and dignity of the philosopher, displayed in his *Analytics*, into all the weakness and credulity of a sophist. Instead of analyzing the several subjects of inquiry, as they present themselves before him, and investigating the secret causes of their truth; he rests, without examination, on the bare authority of others, and erects the principles of his reasoning on their opinions¹⁴, or on what was merely analogous¹⁵ to their opinions. On comparing this, with the former part of the *Organon*, and with some of his other works, were it not written in the manner and style of Aristotle, and authenticated by the same evidence, we could hardly believe that this book

¹² See the 8th book of *Topics*.

¹³ See the book on *Sophistical Elenchs*.

¹⁴ Διαλεκτικὸς δὲ συλλογισμὸς, ὁ ἐξ ἐνδόξων συλλογιζόμενος. — Ἐνδόξα ἔε, τὰ δοκῶντα πᾶσιν, ἢ τοῖς πλείοις, ἢ τοῖς σοφοῖς· καὶ τέτοις, ἢ τοῖς πᾶσιν, ἢ τοῖς πλείοις, ἢ τοῖς μάλιστα γνωρίμοις, καὶ ἐνδόξοις. — *Top. lib. i. cap. 1.*

Ἐσι δὲ πρότασις μὲν διαλεκτικῆ ἐρώτησις ἐνδόξος ἢ πᾶσιν, ἢ τοῖς πλείοις, ἢ τοῖς σοφοῖς· καὶ τούτοις, ἢ πασιν, ἢ τοῖς πλείοις, ἢ τοῖς μάλιστα γνωρίμοις, μὴ παράδοξος· φεῖη γὰρ ἂν τις τὸ δοκοῦν τοῖς σοφοῖς, εἰ μὴ ἐναντίον ταῖς τῶν πολλῶν δόξαις ἦ. — *Ibid. lib. i. cap. 10.*

¹⁵ Εἰσὶ δὲ προτάσεις διαλεκτικαὶ, καὶ τὰ τοῖς ἐνδόξοις ὅμοια. — *Ibid.*

See the 14th chapter of the first book *De Propositionibus Sumendis*.

came from the pen of that profound philosopher. The general propositions constituting the basis of a logic which the schools have so exclusively espoused, are by the method which it prescribes most superficially and illogically formed¹⁶; and the syllogisms which are constructed from them, instead of advancing, or even communicating truth, either conclude in falsehood, or only serve, as they have too long served, to protract useless disputation in noise and nonsense.

The cause of this great defect in the *Organon* of Aristotle may be traced to his blind and extravagant love of syllogism, that favourite child, which he begot in the *Analytics*, and which he resolved to enlarge in its possessions, and qualify with every accomplishment, as the instrument of all kinds of truth. To this should be added his ignorance, or rather neglect of induction, that sound and fundamental logic, by which alone those principles and general propositions, the sole support of useful syllogism in probable reasoning, can be firmly and philosophically established.

He mentions induction, no doubt, in different parts of his works, and gives a just, though general, description of its office¹⁷; but its particular operations he neither employed nor understood. He

¹⁶ See the 9th and 10th books, in which the method is delivered of forming dialectical propositions.

¹⁷ Ἐπαγωγή, ἡ ἀπὸ τῶν καθέκαστα ἐπὶ τὰ καθόλου ἔφοδος.—*Top.* lib. i. cap. 12. See *Analyt. Prior.* lib. xi. cap. 23, et *Post.* lib. ii. cap. 19.

acknowledges the immense importance of principles, by which he always means general propositions, in the discovery of truth¹⁸. But, to the investigation of these principles or general laws, by which the Maker of the world governs the world, he has made, both in his natural and moral dispensations, it was totally insufficient to mention, in a general and incidental way, the sole instrument by which the latent seeds of truth of every kind, so widely scattered or dispersed through all the individuals in nature, can be collected and arranged. Had this profound master of the philosophy of demonstration pursued the right method of forming by induction the principles of probable and contingent truth, according to the nature and genius of every subject which constitutes the circle of human learning; he would have chosen a more honourable and successful road to the temple of science. And then his logic, instead of bewildering and entangling reason in the trammels of partial and imperfect rules, would have afforded her a fair and liberal, though more laborious exercise, in the promotion and advancement of universal truth.

¹⁸ Τῶν ἀρχῶν δὲ αἱ μὲν ἐπαγωγῇ θεωροῦνται, αἱ δὲ αἰσθήσει, αἱ δὲ ἐθισμῶ τινι, καὶ ἄλλαι δὲ ἄλλως. Μετιέναι δὲ πειρατέον ἐκάσας ἧ̄ πεφύκασι, καὶ σπειδάσειον ὅπως ὀρισθῶσι καλῶς. Μεγάλην γὰρ ἔχουσι ῥοπήν πρὸς τὰ ἐπόμενα. Δοκεῖ ἔν̄ πλείον ἢ τὸ ἡμισυ τοῦ παντός εἶναι ἢ ἀρχή, καὶ πολλὰ ἐμφανῆ γίνεσθαι δι' αὐτῆς τῶν ζητημένων.—Ethic. Nicom. lib. i. cap. 7.

From this great imperfection of his dialectic, as the instrument of knowledge, confirmed by the ill success of many of his own philosophical investigations for want of sound and legitimate induction, we may venture to conclude that, if the master of the Lycæum knew their particular use and operation in forming the principles of good reasoning, his time was either too much engaged in collecting and arranging the learning of his age, or his enlarged and scientific mind was too deeply immersed in metaphysical and abstract speculations, to cultivate a mode of reasoning, which is so active and operative, so laborious in its process, and so much occupied in particular experiments.

Instead of descending to the canvass and examination of those individuals which constitute each branch of science, or ascending from them to generals, by successive and laborious steps; he pursued and dictated the more easy, but more fallacious method, of raising topics or common axioms, as the basis of dialectic reasoning. He applied immediately to the categories¹⁹, those great and illustrious families possessed of all prerogative, and invested with all power to decide upon the truth or falsehood of every subject²⁰. From these, he drew definitions and propositions, as from a mine unexhausted and inexhaustible; but which, being

¹⁹ See Top. lib. i. c. 9.

²⁰ Sunt categoriæ quædam familiæ, classes, et ordines entis, seu compendia rerum omnium certa ratione dispositarum, unde disserendi amplissima materies petitur, et ipsa

bare assumptions unfounded in the real nature and qualities of things, had their resources only in imagination or ingenuity of invention. These became prolific of a verbose and artificial, but inefficient logic, and productive of a pompous, formal, but useless and phlegmatic discipline,—a discipline which instead of the advancement, has proved the obstacle and impediment of all real knowledge²¹.

The categories are consequently universal forms ; but between them and the individual and particular cases which solicit our immediate attention, exist a number and subordination of *genera*, through every one of which the logician should pass with the utmost care. Legitimate induction does not rise, by a hasty abstraction or superficial enumeration to the highest generals. Before it presumes to ascend, it descends by a practical and experimental examination of subordinate facts ; and from many particular observations on the powers and properties, the actions and passions, the affections and qualities, the causes and effects of things,

scientiarum objecta tanquam e locupletissima penu depromuntur. Du Val. Synops. Doct. Peripat.

Decem prædicamenta principia sunt et omnis scientiæ et omnis ratiocinationis.—Ibid.

²¹ Ad principia scientiarum constituenda præpropere festinarunt, circa quæ omnis disputationum varietas vertetur: nescientes profectum eum, qui certa nimis propere captaverit, in dubiis finiturum: qui autem iudicium tempestive cohibuerit, ad certa perventurum.—Bacon. De Augm. Scient. lib. v. cap. 4.

after dividing, excluding and rejecting all special matter, it rises to general truths, and thence to more general, till it reaches the most general which can be known²². The great defect therefore of the Aristotelian logic (a defect by which the use and value of the dialectical part are totally destroyed) is the neglect of this primary experimental scrutiny, the omission of these necessary intermediate stages,

²² In constituendo autem axiomete, forma inductionis alia, quam adhuc in usu fuit, excogitanda est: eaque non ad principia tantum (quæ vocant) probanda et invenienda, sed etiam ad axiomata minora et media, denique omnia. Inductio enim, quæ procedit per enumerationem simplicem, res puerilis est, et precario concludit, et periculo exponitur ab instantia contradictoria, et plerumque secundum pauciora quam par est, et ex his tantummodo quæ præsto sunt, pronunciat. At inductio, quæ ad inventionem et demonstrationem scientiarum et artium erit utilis, naturam separare debet, per rejectiones et exclusiones debitas; ac deinde post negativas tot quot sufficiunt, super affirmativas concludere; quod adhuc factum non est, nec tentatum certe, nisi tantummodo a Platone, qui ad excutiendas definitiones et ideas, hac certe forma inductionis aliquatenus utitur. Verum ad hujus inductionis sive demonstrationis instructionem bonam et legitimam, quamplurima adhibenda sunt, quæ adhuc nullius mortalium cogitationem subiere; adeo ut in ea major sit consumenda opera, quam adhuc consumpta est in syllogismo; atque hujus inductionis auxilio, non solum ad axiomata invenienda, verum etiam ad notiones terminandas, utendum est. Atque in hac certe inductione, spes maxima sita est.—Ibid. Nov. Org. lib. i. aph. 105.

De scientiis tum demum bene sperandum est, quando per scalam veram et per gradus continuos, et non intermissos aut hiulcos, a particularibus ascendetur ad axiomata minora, et deinde ad media, alia aliis superiora, et postremo demum ad generalissima. Etenim axiomata infima non multum ab

and the deduction of its arguments too hastily and superficially from the highest forms²³. This is an error into which its author appears to have been partly betrayed by his love of metaphysics, the science of universals; and partly by forming his method of universal reasoning, from that of the mathematical or demonstrative science, which is conversant only in general truth.

Thus the theory of syllogism delivered in the *Organon* remains a splendid monument of human invention, a superb and stately fabric raised from the ablest specimens and examples of mathematical and demonstrative science, by the analytical acumen and mental philosophy of its author; but which, like the temples of the heathen divinities, on the ruins of which we may look with admiration, was never employed to any useful or honourable purpose. To devise another *Organon* of a different origin and construction, was an honour reserved for a future philosopher of an age and

experientia nuda discrepant. Suprema vero illa et generalissima (quæ habentur), notionalia sunt et abstracta et nil habent solidi. At media sunt axiomata illa vera et solida et viva, in quibus humanæ res et fortunæ sitæ sunt; et supra hæc quoque tandem ipsa illa generalissima; talia scilicet quæ non abstracta sint, sed per hæc media vere limitantur.—Ibid. lib. i. aph. 104.

²³ In notionibus nil sani est, nec in logicis, nec in physicis; non substantia, non qualitas, agere, pati, ipsum esse, bonæ notiones sunt,—sed omnes phantasticæ et male terminatæ.—*Ibid. lib. i. aph. 15.*

country remote from the Stagirite. This, instead of puzzling learning with artificial forms and perplexing knowledge with disputation, has put truth and nature to the torture by a thousand tests, and forced them to confess those secrets, which in spite of syllogism, had hitherto lain concealed, by which arts and sciences have been improved, to the great honour of learning and advantage of society. And, whereas Aristotle constructed or rather extracted the rules of his Poetics, his Rhetoric and Logic, after poets, orators, and philosophers had brought their respective professions to considerable perfection, by their natural sagacity and strength of mind ; it is the peculiar honour of Bacon, that he delineated the rules of his inductive logic with great amplitude and precision, before the world had beheld any philosophical example of its truth. This argues an effort and strength of mind which eclipses even the merit and fame of Aristotle :

Him for the studious shade
 Kind Nature form'd, deep, comprehensive, clear,
 Exact, and elegant : in one rich soul,
 Plato, the Stagirite, and Tully join'd.
 The great deliverer he ! who from the gloom
 Of cloister'd monks, and jargon-teaching schools,
 Led forth the true Philosophy, there long
 Held in the magic chain of words and forms,
 And definitions void : he led her forth,
 Daughter of Heaven ! that slow-ascending still,
 Investigating sure the chain of things,
 With radiant finger pointing to the skies.

THOMSON.

On the appearance of this luminary in the firmament of science, after they had laboured in the search of truth for near two thousand years with a dark and imperfect guide, the *Novum Organum* of Bacon gave a new turn to the labours and studies of philosophers. They learned gradually to hold all vain hypotheses and mental fabrications in just contempt, and to respect nothing but propositions established upon facts, sufficiently tried and critically examined, and conclusions drawn from them by a fair and philosophical interpretation. The good sense of our sister university, enlightened by the genius of this her favourite son, burst asunder to her immortal honour the bonds of logical disputation by which she had been long enslaved, and vindicated the liberties of truth, by cultivating all its branches, according to the rules of this inductive logic. Sir Isaac Newton, if not the first, was at any rate, the most distinguished philosopher, who pursued and exemplified this better logic, in various branches of natural philosophy. Its value may be best appreciated from the wonderful effects it has produced in the hands of that exalted genius, both in his *Principia* and *Optics*. From these immortal labours, the *Organum* of Lord Bacon, the product of his own great and unassisted mind, might, by a kind of reflection, be still further improved and perfected.

It was in the ardent hope and expectation of the well-appointed study and cultivation of this *New Organ*, and of its application to all other parts of

learning, this great philosopher so earnestly and respectfully addressed our two celebrated English universities. The one has long since, as we have remarked, responded to this earnest and respectful appeal; and it now remains for the other to prove, that however late, she can still vindicate her rights against the ancient despotism of the Stagirite.

The *Organon* of Aristotle, on the contrary, instead of being, as he vainly hoped, the instrument of all truth, has been the instrument of ignorance and error²⁴; thus that great philosopher has proved in the event the greatest tyrant in the universe. He not only subverted, with a bold and licentious hand, all the systems of the philosophers who went before him (not sparing even that of his master Plato, as his pupil Alexander spared all the empires of the east), but by that instrument, he manacled the philosophy of all future times. Though the dominion of that great prince and conqueror has vanished for many ages, and is now as though it never had existed, the chain of the

²⁴ Qui summas dialecticæ partes tribuerunt, atque inde fidissima scientiis præsidia comparari putarunt, verissime et optime viderunt, intellectum humanum sibi permissum, merito suspectum esse debere. Verum infirmior omnino est malo medicina; nec ipsa mali expers: siquidem dialectica, quæ recepta est, licet ad civilia et artes, quæ in sermone et opinione positæ sunt, rectissime adhibeatur; naturæ tamen subtilitatem longo intervallo non attingit; et prensando quod non capit, ad errores potius stabiliendos et quasi figendos, quam ad viam veritati aperiendam valuit.—
De Augm. Scient. Præf.

philosopher is felt at this day by many learned bodies and societies, through some of the most civilized and enlightened parts of Europe²⁵. His logic rendered more imperfect by ignorant and barbarous commentators, extolled as completely equipped to attend reason in the search and communication of all truth, infallible as a guide and incapable of improvement²⁶, has long superseded every other; keeping learning and science in a dark and gloomy prison, and drawing a cloud over the disk of the literary sun, by which it was for centuries eclipsed.

Whilst commentators, especially the Latin and Arabian, were obscuring this dark system by their illustrations, and the schoolmen were contending with great subtlety and little sense, and growing warm in disputation,—truth and learning were left to starve, cramped in their growth, and blasted in their prospects, in consequence of being deprived of their natural support and succour²⁷. Instead of

²⁵ *Cæterum de viro tam eximio certe, et ob acumen ingenii mirabili, Aristotele, crediderim facile hanc ambitionem eum a discipulo suo accepisse, quem fortasse æmulatus est; ut si ille omnes nationes, hic omnes opinionones subigeret, et monarchiam quandam in contemplationibus sibi conderet.*—*Ibid. De Augm. Scient. lib. iii. cap. 4.*

²⁶ *Primus mortalium Aristoteles certum logicæ finem constituit, precepta in ordinem redegit, singulari artificio integræ artis methodum contexit. Quam invenit logicam, tam feliciter perfecit, ut in hunc usque diem, per annos circiter bis mille, perpetuis clarissimorum virorum studiis exculta, nihil prorsus acceperit incrementi.*—*Aldrich.*

²⁷ “The slow progress of useful knowledge, during the many

extracting the pure and genuine ore, by an experimental and inductive process, these champions of syllogism were employed in raking together heaps of sophisticated dross, which they valued as the purest gold. Instead of pursuing Nature through her hidden stores, and connecting truth with truth, by a gradual operation into a useful and well-compacted chain, they fabricated their boasted systems of base materials, with all the subtlety of their art, into a useless and cumbrous yoke. Instead of connecting science with science, according to their natural order and relation, and erecting them into one great edifice of truth, they filled the schools with heaps of indigested rubbish, which however worthless and despised by some, adds to its inutility this disgrace,—that it still remains, in a great measure, to be removed by ourselves, or our posterity.

That even the Christian religion,—the most sublime and important of all truth,—was enabled to emerge from those errors and superstitions in which it was involved for ages, disguised and patronised, as they were, by the artifice and subtle-

ages, in which the syllogistic art was most highly cultivated as the only guide to science, and its quick progress since that art was disused, suggest a presumption against it; and the presumption is strengthened by the puerility of the examples which have been always brought to illustrate its rules.”—Dr. Reid’s Appendix to vol. iii. of Lord Kaims’s Sketches.

ties of such a logic²⁸, is a profound and solemn mystery, which can be explained only by referring the emancipation of this pure offspring of heaven, to the special interposition of its Divine Author, who became in his appointed time, the vindicator of his own honour, and the assertor of its awful and stupendous doctrines.

²⁸ “What is more sacred among sciences than divinity?—You have profaned it, by bringing in of that which you term scholastic, gathered out of Lombard, master of the Sentences, which has engendered unto us the race of the Thomists, Scotists, Albertists, Occamists, Realists, Nominalists, and such others, whose foundation is laid upon the subtleties of Aristotle. Let any man remark the themes of your sermons, the disputations of your schools, together with those great and huge volumes of commentaries upon the four books of the Sentences. Oracles are received every where from the *Tripus* of this philosopher, and the universities, that ought to be instituted after a Christian manner, are changed into the academies of that heathenish Athens. You spend more time in clearing that which seemeth ambiguous and doubtful in the doctrine of that ingrate disciple toward Plato, than in teaching your flocks the law of the gospel. The oaths which the universities do exact of their initiates and bachelors, that they shall not control him, are witnesses of the truth of what I speak.”—De Croy’s First Conformity, cap. 3.

[This quotation is taken from a work very scarce and little known, entitled, “The Three Conformities, or the Harmony of the Romish Church with Gentilism, Judaism, and Ancient Ceremonies, by W. Hart; London, 1620,” 4to. It is a translation from the French, and the only copy I have met with is in the library of Sion College.—*Editor.*]

APPENDIX II.

THE AUTHOR'S APOLOGY.

AN attack levelled thus openly and directly against a system of universal logic,—sanctioned by the authority of Aristotle and made venerable by its antiquity, which has led the discipline of this seat of learning for many ages, and which maintains a kind of perfection in the opinion of some, holds a doubtful sway in the minds of others, and is totally discarded by few,—may, I suspect, offend the ears of most of those who hear me, and sound from this place, as the voice of blasphemy and rebellion. It may be fairly expected, that a charge, so solemn and unqualified, should be substantiated by some further evidence, or else relinquished, or—at least,—that some apology should be offered.

My apology is (if the love of truth need any apology—a love which, as it thinks, it fears, no ill), that I could not pursue the plan of these lectures, of which the different methods of reasoning form the most essential part, without incurring the displeasure of the school-logic by noticing its defects. I confess myself unwilling to relinquish

the charge, because I am persuaded, in my own mind, that it is just, till otherwise convinced,—yet am I open to fair conviction. And, that my apology may be something more than mere form and ceremony, at which my mind revolts as much as it loves the truth, I will endeavour to substantiate it, by bringing forward a proof or example of the falsehood and absurdity of the Aristotelian Dialectic, on which the school discipline has been formed in every part of scientific learning.

It is the criterion of all sound logic, that it leads to truth ; and the great exception which I have taken to the topical or dialectic reasoning of the Stagirite, results from the very hasty and unphilosophical method which he prescribes of forming the general propositions, axioms, or maxims, as the principles, from which all contingent and probable conclusions, moral as well as physical, are to be drawn. If they be infirmly and illogically framed, all syllogism, however formally and logically deduced, will either conclude falsely, or, at best, unphilosophically, owing its triumph to accident, conjecture, or sophistry, and not to sound argument, should the conclusion even happen to prove true.

One of the universal sources, among others, from which Aristotle, by this wonderful invention, directs these dialectical propositions to be formed into the principles of probable reasoning, and that one of the least exceptionable, is the “ rule of

contraries or opposites¹.” This he has exemplified and illustrated by a favourite instance; and the point to which I would now direct your attention, is the example of a proposition formed from this rule, which he intends to be universal in its operation (for he has directed that all these propositions should be as universal as possible²), and which affects, in its operation, an interesting and important branch of moral science—“For example,” says he, “if it be a duty to wish well, and do good to our friends, it is equally a duty to wish ill, and do evil to our enemies³.”

¹ *Ἐνδοξον δὲ καὶ ἐν παραβολῇ φανεῖται τὸ ἐναντίον περὶ τοῦ ἐναντίου.*—Top. lib. i. cap. 10.

This rule is triumphantly brought forward by his great modern champion to upset a principle of the Newtonian philosophy. “It was in this way the ancients argued concerning opposite things; and particularly that great master of the reasoning art, Aristotle, who in his book of Topics has taught us that, if two things be opposite, opposite things will follow from them. Aristotle expresses the rule of reasoning in his short way thus:’ *Εἰ τὸ ἐναντίον ἐναντίῳ, καὶ τὸ ἐναντίον ἐναντίῳ.*—Ancient Metaphysics, vol. ii. p. 338.

See chap. 10, lib. 1. Topic. De Proposit. Dialectic.

² *Δηπτέον δὲ, ὅτι μάλιστα καθόλου πάσας τὰς προτάσεις, καὶ τὴν μίαν, πολλὰς ποιητέον, οἷον, ὅτι τῶν ἀντικειμένων αὐτὴ ἐπισήμη.*—Ibid. Top. lib. i. cap. 14.

³ *Οἷον, εἰ τὸς φίλους δεῖ εὖ ποιεῖν, καὶ τὸς ἐχθροὺς δεῖ κακῶς φανείη δ’ ἂν καὶ ἐναντίον τὸ τοὺς φίλους εὖ ποιεῖν τῷ τὸς ἐχθροὺς κακῶς.*—Ibid. lib. i. cap. 10.

See this favourite rule of contraries further illustrated by the same example.—Top. lib. ii. cap. 7.

The proposition which forms the first part of the opposition—"It is a duty to wish well, and do good to our friends," is indeed universally true; but the second, which from this great rule of contraries Aristotle determined to be equally true—"It is also a duty to wish ill, and do evil to our enemies,"—unfortunately for his dialectic reasoning upon this important subject, happens to be universally false, in every moral sense; and, by its application, has introduced many mischievous and fatal errors in practical ethics. One might indeed be induced to conclude, from a principle and mode of reasoning more probable than those which are delivered in his *Dialectics*, that One, who despised such vain philosophy, had this false and pernicious axiom, which had made such havoc in the moral system, in his omniscient mind, when he pronounced to his auditors on the mount the following divine instruction,—“Ye have heard that it hath been said [by them of old time⁴], Thou shalt love thy neighbour, and hate thine enemy; but I say unto you, love your enemies; bless them that curse you; do good to them that hate you; and pray for them that despitefully use you, and persecute you⁵.” For the truth of this divine aphorism, our Lord does not appeal to any of the

⁴ Matt. v. 21, 27, 33.

⁵ Ἠκούσατε ὅτι ἐβρόχθη· Ἀγαπήσεις τὸν πλησίον σου, καὶ μισήσεις τὸν ἐχθρόν σου. Ἐγὼ δὲ λέγω ὑμῖν· Ἀγαπάτε τοὺς ἐχθροὺς ὑμῶν, εὐλογεῖτε τοὺς καταρωμένους ὑμᾶς, καλῶς ποιεῖτε

topics and factitious principles of Aristotle; but through a sublime analogy, to a more certain and infallible rule—the will and example of his heavenly Father, the final and immutable criterion of all moral truth—“That ye may be the children of your Father which is in heaven; for he maketh his sun to rise on the evil and on the good, and sendeth rain on the just and on the unjust—that ye may be perfect, even as your Father which is in heaven is perfect⁶.”

In the preceding pages, having paid a just respect to the moral philosophy of the Stagirite, I cannot help adverting in this place to its great, I had almost said, its sole defect—the imperfect and inadequate principle on which it is founded. Had he known the genuine foundation of moral virtue, which nothing but revelation could adequately discover, the ethics of Aristotle would have exhibited a monument of that perfection, to which it is so seldom the lot of mortals to attain.

But to take an exception to the whole Dialectic from the failure of one rule, though in a most important point, may be thought partial and unfair; let us therefore take a more general view of the design and scope of the whole, as they are

τὰς μισῶντας ὑμᾶς, καὶ προσεύχεσθε ὑπὲρ τῶν ἐπηρεαζόντων ὑμᾶς, καὶ διωκόντων ὑμᾶς.—Matt. v. 43, 44.

Μηδὲν ἐκὸν ἀντὶ κακῶ, &c. See Rom. xii. 17—21.

⁶ Matt. v. 45, 48.

proposed in the book of Topics, and also of the effect it has produced on the other parts of his works.

The general design is given in the first sentence of the first book ; and is so extensive and enlarged, as to embrace every subject of probable or contingent reasoning⁷.

In the second chapter, the general scope is divided into three specific objects—exercise, conversation, and philosophical sciences⁸. With regard to the first object, that of exercise, it professes to furnish a method of disputing on either side in every possible question⁹. In reference to conversation, it professes to qualify men to weigh and to examine the opinions of many and to refute them, if they do not appear to be well founded¹⁰. And in respect of the third object,—the philosophical sciences, which is the most important,—it professes wonders,—not only to enable men to doubt on

⁷ Ἡ μὲν πρόθεσις τῆς πραγματείας μέθοδον εὔρεϊν, ἀφ' ἧς δυνησόμεθα συλλογίζεσθαι περὶ παντὸς τῆ προτεθέντος προεβλήματος ἐξ ἐνδόξων.—Aristot. Top. lib. i. cap. 1.

⁸ Ἐστὶ δὴ πρὸς τρία χρήσιμος, πρὸς γυμνασίαν, πρὸς τὰς ἐντεύξεις, πρὸς τὰς κατὰ φιλοσοφίαν ἐπιστήμας.—Ibid. lib. i. cap. 2.

⁹ Ὅτι μὲν οὖν πρὸς γυμνασίαν χρήσιμος, ἐξ αὐτῶν καταφανές ἐστι· μέθοδον γὰρ ἔχοντες, ῥᾶον περὶ παντὸς τῆ προτεθέντος ἐπιχειρεῖν δυνησόμεθα.—Ibid.

¹⁰ Πρὸς δὲ τὰς ἐντεύξεις· διότι τὰς τῶν πολλῶν κατηριθμημένοι δόξας, ἕκ ἐκ τῶν ἀλλοτριῶν, ἀλλ' ἐκ τῶν οἰκείων δογμάτων ὀμλήσομεν πρὸς αὐτοῖς, μεταξιβάζοντες, ὅ, τι ἂν μὴ καλῶς φαίνωνται λέγειν ἡμῖν.—Ibid.

both sides of every question, but to determine what is true or what is false, with the greatest facility¹¹. In addition to this, it makes it the proper and peculiar business of dialectic logic, to investigate and establish the principles of all the sciences¹².

How far, with such flattering promise, it has answered the lofty hope and expectation of its inventor, facts and experience will best decide. Its utility and value will be the most clearly ascertained by the fruits and effects which it has produced. “Fruits and inventions are the proper sponsors and sureties for the truth of different philosophies¹³.”

Of its operation and effect in the mouth of Aristotle, whether in disputation or conversation, which terminate in a *viva voce* practice seldom committed to writing, we cannot perhaps form any clear and decisive judgment. It may however be here observed once for all, that in those of his

¹¹ Πρὸς δὲ τὰς κατὰ φιλοσοφίαν ἐπιστήμας, ὅτι δυνάμενοι πρὸς ἀμφοτέρα διαπορῆσαι, ῥᾶον ἐν ἐκάστοις κατοψόμεθα τάληθές τε καὶ τὸ ψεῦδος.—Ibid.

¹² Ἐτι δὲ πρὸς τὰ πρῶτα τῶν περὶ ἐκάστην ἐπιστήμην ἀρχῶν. Τῆτο δ' ἴδιον, ἢ μάλιστα οἰκέιον τῆς διαλεκτικῆς ἐστιν. Ἐξετάσκει γὰρ οὔσα, πρὸς τὰς ἀπασῶν τῶν μεθόδων ἀρχὰς ὁδὸν ἔχει.—Ibid.

¹³ Inter signa nullum magis certum aut nobile est, quam quod ex fructibus. Fructus enim et opera inventa, pro veritate philosophiarum velut sponsores et fidejussores sunt.—Bacon. Nov. Org. lib. i. aph. 73.

works which have come down to us, he never uses the formal syllogism, but conveys his meaning in a style pure, concise, nervous, and elegant, though often obscure. And thus the practice of its author is so far a contradiction, and no inconsiderable objection to the logic which he prescribed.

In the philosophical sciences, which he has so largely treated, we may however fairly judge of the value and utility of this universal art, from the effects which it has therein produced.

One striking specimen of its ill success has been exhibited in his ethical philosophy. Let us now advert to the fruits it has produced under the cultivation of Aristotle in the field of natural philosophy. Not one of his warmest advocates, however sanguine in his cause, though he may have taught them to dispute every thing and to prove nothing, will, I think, be so hardy as to dispute his ability of doing all possible justice to his own invention. By principles, he always means general propositions, and it is the boast of his Dialectic to investigate the principles of every science terminating in probability, and to decide on truth and falsehood in each. Beginning however at the wrong end of the inquiry, and pursuing a false method in its progress, his logic was never able to produce one sound axiom in physics. Indeed his idea of the philosophical sciences in general was very hastily and superficially formed, as he supposed that in them, truth was a thing very easily to be found; which misconception of the

difficulty of science might prejudice his understanding, and form a principal cause of his erroneous method of physical investigation. But logic was his favourite offspring, destined to rule and domineer over every other branch of his literary family, to whose despotic sway every other part of learning was to be made a sacrifice. It is the result of the whole, that his physics, which from the hands of such a luminary of knowledge one might expect to be all light, originating in a weak and presumptive logic, which dealt in notions and hypotheses instead of experiments and observations, terminate in the darkest ignorance. If we except the sublime devotion of the few last chapters, this book of the Peripatetic is fitted for no other use, than to furnish factitious materials for idle disputation¹⁴.

And what is here observed of his physics will hold equally good of his metaphysics, which, instead of building solid truth on an inductive foundation, by the painful process of self-observation, leap at once into abstractions of his own invention, from which ready made materials nothing is erected but visionary castles in the air. The cause of this fundamental error, from which

¹⁴ Atque ex philosophiis istis Græcorum, et derivationibus earum per particulares scientias, jam per tot annorum spatia, vix unum experimentum adduci potest, quod ad hominum statum levandum et juvandum spectet, et philosophiæ speculationibus ac dogmatibus vere acceptum referri possit.—Bacon. Nov. Org. lib. i. aph. 73.

many others are derived, is expressed by himself in his first book of Topics—"Ἐξ Ἐνδόξων"¹⁵—that is, the arguments of syllogism were to be drawn, not from such general truths and propositions as are inductively and experimentally proved, but from such as might only appear to be true.

The labours of other philosophers have been attended in their application of this logic to the sciences with similar success, from this cause, that, by this method of inquiry, the true forms of things, from which sound axioms are made, can never be obtained. And the root of the evil is this, that men draw their attention too soon and too far from experience and particulars, and give themselves up to reveries and disputations¹⁶." The slow progress of science and philosophy, during the many ages in which the syllogistic method was employed in the cultivation of learning, is a proof founded in experience, which evinces its falsity and futility. Though it has espoused many an error and given birth to many more, with regard to the advancement

¹⁵ Διαλεκτικός δὲ συλλογισμὸς, ὁ ἐξ ἐνδόξων συλλογιζόμενος. cap. 1.

¹⁶ Quia illo inquirendi modo, qui hucusque in usum venit, nunquam in sæculum comparebunt rerum formæ. Radix autem mali hujus, ut et omnium, ea est; quod homines et propere nimis et nimis longe, ab experientia et rebus particularibus, cogitationes suas divellere et abstrahere consueverunt, et suis meditationibus et argumentationibus se totos dedere.—Bacon. De Augm. Scient. lib. iii. cap. 4.

and propagation of truth, it will die at last a vestal, without bringing into the world one new discovery.

How far the Dialectics of the Stagirite have contributed, amongst the disciples of his school, to the ease and advantage of conversation, or to the clearness and elegance of that intercourse which prevails in the higher and more literate departments of society, is a point which may be said to be very problematical. But that his third expectation, that of exercise (which, as he places it the first in order, seems to have been the chief in his intention), has been fully answered, is a truth confirmed by the fatal experience of many ages. The exercise of disputation, not the advancement of learning, appears to have been his great and leading object. His logic is indeed admirably calculated for this favourite end. Its principles and axioms are all so loosely and indiscriminately formed, and are in themselves so vague and indistinct, that they will apply to one question equally with another. By an artful management of terms and propositions in the different forms of syllogisms, they can often be adapted to either side of the debate. By this syllogistic dexterity and sophistic art, so much darkness and confusion can be introduced into every subject, that the disputation, after many a round, in which the combatants on both sides are elated with ideal conquest, terminates in an unedifying logomachy, or contest of artificial words. Instead of useful and sober truth, in which both might equally rejoice and mutually partake, the

result is furious contention, proud animosity, and personal resentment¹⁶. Instead of being finally determined and decided (by which they would be finally lost), the same questions which were disputed still remained to be disputed, and were preserved with a jealous care, for the advancement of this favourite exercise, to become the theme of future contests, victories, and triumphs. And to complete this syllogistic exercise, with every necessary equipment for its honour and extension, its founder has delivered the precepts for the assailant to make his attack so as to ensure the victory, or for the respondent to keep him at such a distance, as never to be forced to yield—that each may descend from the well-fought field with the pride of an able warrior, and with something like conquest on his brow¹⁷.

The natural effect of exercise in this doubtful disputation was suspicion and uncertainty in the minds of its ablest practitioners, instead of promoting clearness and conviction or the advancement of truth¹⁸. For the sake of this exercise, the

¹⁶ St Paul has given us an admirable picture drawn by his expressive pencil from his observation on a disputant in theology: *Τεύφωται, μηδὲν ἐπισάμενος, ἀλλὰ νοσῶν περὶ ζητήσεις καὶ λογομαχίας· ἐξ ὧν γίνεται φθόνος, ἔρις, Ἐλασφημίαι, ὑπόνοιαι πονηραὶ, παραδιατριβαὶ διεφθαρμένων ἀνθρώπων τὸν νοῦν, καὶ ἀπεσερημένων τῆς ἀληθείας.*—1 Tim. vi. 4, 5.

¹⁷ See the second book of the First Analytics, and the last book of the Topics.

¹⁸ Chillingworth was a man of great ability of understanding, and of a rare temper in debate. He had passed all

schoolmen embraced a logic devoid of every other use or qualification, which they erected into the standard of their discipline and the director of all their studies, and which, together with the other works of Aristotle, they cherished by a weak and ignorant, though unanimous assent¹⁹. It indulged their indolence and flattered their vanity. And whilst they devoted their whole attention to his works, they idolized their author. Hence all improvement in science was checked at once, the progress of learning obstructed; every attempt to advance in knowledge defeated and disgraced; and the road to learning was stopped with Aristotle, who became at once the umpire of reasoning and standard of truth²⁰.

his younger time in disputation, and had arrived at so great a mastery as to be inferior to no man in these skirmishes. But he had, with this notable perfection in this exercise, contracted such an irresolution and habit of doubting, that by degrees he grew confident of nothing, and a sceptic at heart in the greatest mysteries of faith.—Lord Clarendon's *Life*, p. 55.—*Author*.

Perhaps the best modern examples of the use of formal syllogisms, may be found, in some of his disputes with the Jesuits of his day. See particularly his argument against Romish infallibilities, from their contradictions on transubstantiation, in the "additional discourses" at the close of his works, edit. 1719.—*Editor*.

¹⁹ Quod vero putant homines, in philosophia Aristotelis, magnum utique consensum esse—illud de consensu fallit homines, si acutius rem introspiciant. Verus enim consensus is est, qui ex libertate judicii, re prius explorata, in idem conveniente, consistit.—Bacon. *Nov. Org.* lib. i. aph. 77.

²⁰ Si hujusmodi scientiæ plane res mortua non essent, id minime videtur eventurum fuisse, quod per multa jam sæcula

And here we may look for one, if not the main cause of the darkness of the middle ages, which affected indiscriminately the arts, the sciences, and the Christian religion. This darkness, the universities of Europe, which should have been the lights of the world, contributed to increase and continue, by their bigoted use of this false and artificial logic. Under this obscurity, increased by such a study, the tyrant of the Romish hierarchy practised his tyranny over the minds and bodies of princes as well as people. Amidst this darkness, and supported by this logic, he introduced all the absurd and impious assemblage of ceremonies and innovations, to the great corruption of the purity, and the greater scandal of the piety and simplicity of the primitive church. Under its auspices, he introduced feigned traditions, together with the doctrines of transubstantiation, image-worship, and invocation of saints, and sale of

usu venit, ut illæ suis immotæ fere hæreant vestigiis, nec incrementa genere humano digna sumant: eo usque ut sæpenumero non solum assertio maneat assertio, sed etiam quæstio maneat quæstio, et per disputationes non solvatur, sed figatur et alatur; omnisque traditio et successio disciplinarum repræsentet et exhibeat personas magistri et auditoris, non inventoris, et ejus qui inventis aliquid eximium adjiciat. In artibus autem mechanicis, contrarium evenire videmus. Quæ, ac si auræ cujusdam vitalis forent participes, quotidie crescunt et perficiuntur; et in primis auctoribus rudes plerumque et fere onerosæ et informes apparent, postea vero novas virtutes, et commoditatem quandam adipiscuntur, eo usque, ut citius studia hominum et cupiditates deficiant et mutantur, quam illæ ad culmen et perfectionem suam per-

indulgences, by which he enriched his coffers from the pockets of his spiritual slaves in all the nations of Europe. To this infamous and deplorable state of things, the universities, under the dominion of Aristotle, in those ages powerfully contributed, affecting amidst all their ignorance, the pride and ambition of the master whom they so implicitly obeyed.—See Cave. Hist. Lit. vol. i. Prolegom. pp. 1, 2.

And thus, after levelling the systems of all preceding philosophers and producing others of his own invention, bequeathing some vague and general hypotheses, as a legacy to his disciples, with a fund to raise more at pleasure, that they might do immortal honour to his logic²¹ by affording it perpetual exercise in the schools of Athens or elsewhere,—Aristotle locked up the temple of knowledge and threw away the key, which, in the absurd and superstitious veneration of his authority,

venerint. Philosophia contra, et scientiæ intellectuales, statuarum more, adorantur et celebrantur, sed non promoventur: quin etiam in primo nonnunquam auctore maxime vigent, et deinceps degenerant.—Bacon. Nov. Org. Præf.

²¹ Adamant homines scientias et contemplationes particulares; aut quia auctores et inventores se earum credunt; aut quia plurimum in illis operæ posuerunt, iisque maxime assueverunt. Hujusmodi vero homines, si ad philosophiam et contemplationes universales se contulerint, illas ex prioribus phantasiis detorqueant et corrumpunt; id quod maxime conspicuum cernitur in Aristotele, qui naturalem suam philosophiam, logicæ suæ prorsus mancipavit, ut eam fere inutilem et contentiosam reddiderit.—Id. Nov. Org. lib. i. aph. 54.

was lost for many ages. It was found at last by a native of our own country, whose name as a philosopher, and particularly as a logician²², does more honour to England than his to Stagira; who threw open the prison in which science had been held captive, and once more set her free; who, with a bold and virtuous sacrilege, tore the laurel from the brow of that dark and deified philosopher, which he had so long and so injuriously worn.

That the Aristotelian logic was introduced in the universities of Europe, that it was admitted as the guide to truth and the vehicle of instruction, and was erected as the standard of their general discipline, cannot be a subject of surprise, when we reflect, that as the sciences and arts were spread from Athens over the provinces of Europe, the merit of all learning consisted, for many ages, in studying the languages, reading the authors, and retaining and retailing whatever they contained. And since the matter of various kinds, collected by Aristotle from all the philosophers of antiquity, and digested and improved by him, was embraced with implicit confidence, the syllogistic method, of which he claimed the sole invention, was held in the highest veneration and esteem, and adopted as the instrument of universal science. The wonder

²² Illud vero monendum, nos, in hoc nostro organo, tractare logicam, non philosophiam.—Nov. Org. lib. ii. aph. 52.

is,—that after the authors of antiquity had been well read and understood, and their subjects of information sufficiently exhausted, that when philosophers and divines dared to advance in the detection of their errors, as well as in the search and discovery of solid truth,—the scholastic discipline did not incur the same fortune with the improvement of philosophy, or the reformation of religion; that it was not canvassed and examined at that era; exploded, if false, or corrected, if erroneous.

But the dialectic logic, which, on the blind authority of Aristotle, first took possession of the schools, held that possession too strongly fortified and secured by the warm prejudice and bigoted prepossession of its votaries; supported on the one hand by the ignorance which it promoted, and cherished on the other by the indolence which it indulged. The vanity of the schoolmen embraced it with rapture and fostered it with ambition, offering to its inventor, not merely the overflowings of their gratitude, but the first fruits of their devotion²³, thus furnishing them with a

²³ The zeal of one of these devotees may probably entertain the reader: “*Est ergo ars, sive scientia, bene disserendi, ante alias omnes philosophiæ partes accersenda, sine cujus auspiciis nihil certo sciri recteque intelligi possit. Hinc enim ars artium, scientia scientiarum dicta est; non quasi sit scientiarum princeps, et præstantissima (hic enim titulus uni theologiæ, id est, metaphysiçæ, debetur), sed, quod ad omnes sit necessaria, ideo accommodatius dicitur organum organorum, instrumentum instrumentorum, ancilla, clavis,*

happy expedient, by which their pregnant fancy could raise notions and hypotheses, fair structures of their own (Ἐξ Ἐνδοξῶν), as the principles of argumentation, without any of the pains of personal experiment, or labour of inductive investigation²⁴. These supplied them, at the same time, with all its modes and figures, in which they could show their ingenuity, by casting the fruitful offspring of that fancy into various shapes, and display their numerous syllogisms and sophisms before ignorant admirers, in all the pride of formal disputation. And thus, in the darkness of the schools, this weak and antiquated discipline has continued to triumph from age to age over the improvement of science. In these strong-holds, as an enchanted castle, by brandishing its rusty armour, it has held out against a much stronger and better claimant, maintaining its authority by keeping up an external, but insignificant formality, with no inconsiderable degree of parade and ostentation.

But as truth and knowledge are never at a stand,

janua, spes, testa, murus philosophæ, docendi vero discendi-que magistra, veri falsique disceptatrix et judex; arbitra etiam methodorum, definitionum, divisionum, syllogismorum, Pegasus ungula, Silenus Alcibiadis, plus habens in recessu, quam in fore, lima ingeniorum, cos veritatis, ars disputandi, scientia rationis oratione conclusæ, denique rationalis, sive logica, dissertatrix, sive dialectica.”—Du Val. *Synops. Analyt. Doct. Peripat.*

²⁴ De inductione vero dialectici vix serio cogitasse videntur, levi mentione eam transmittentes, et ad disputandi formulas properantes.—Bacon. *De Augm. Scient. Distr. Op.*

so neither are ignorance and error. The syllogism of Aristotle, the chief defect of which results from the imperfection of the principles it adopts, has in these latter ages been supplanted, or rather mixed and confounded with a thing of modern invention²⁵,—more like the decision of a carpenter, than the conclusion of a philosopher; insomuch that the present scholastic syllogism is so compounded and metamorphosed, that the schoolmen would be now unable to determine either what it is, or of what it is composed²⁶.

“ Verily thou art a God that hidest thyself²⁷, ”—is the character given by an ancient prophet to the Author of all truth; and to “ search him out²⁸ ” in his mysterious dispensations of nature and of grace, constitutes in the judgment of another sacred writer, “ the honour of the first of men.” That all human knowledge, at any time or in any period of the world, however favoured by circumstances, should remain subject to the law, or determined by the standard of one man or class of men, where inspiration is not concerned, is an affront to the human understanding. It supposes, that since the days of Aristotle, our faculties are impaired by time or injured by abuse, and that after the labours of near two thousand years no advancement has been made in the discovery of truth. It is, at the same

²⁵ See p. 114.

²⁶ See Wallis's Logic, cited Ibid.

²⁷ Isaiah, xlv. 15.

²⁸ Proverbs, xxv. 2.

time, an affront to the majesty of the Deity, who is unsearchable in his counsels and inscrutable in all his ways, as it presumes that the depths of his power and wisdom are completely fathomed. This was a prejudice, which however weak and impious, took and retained possession of the minds of men for many ages ; and which, growing into a confirmed and inveterate bigotry, prohibited further researches, under the pretence of avoiding hurtful innovations. The genuine love of truth, which should burn with a free and ardent flame, was smothered by this prohibition, and the exercise of the understanding shackled and confined in its pursuit. The merit of the student was made to consist, not in advancing knowledge by adding to its stock, or by rectifying and correcting what was false and imperfect ; but in remembering and preserving what was already only supposed to be known, or confirmed by an implicit and ignorant consent. Learned men, instead of roaming at large through the field of knowledge, in the quest and acquisition of truth from every quarter, were like a flock of sheep following each other in the same beaten track of ignorance and error²⁹.

Under the cloud of this prejudice and intolerant bigotry, the public discipline of the schools was erected upon the model of Aristotle and sanctioned by his authority, which was made absolute

²⁹ Numerus longe maximus eorum, qui in Aristotelis philosophiam consenserunt, ex præjudicio et auctoritate aliorum, se illi mancipavit ; ut sequacitas sit potius et coitio, quam consensus.—Bacon. Nov. Org. lib. i. aph. 77.

and unchangeable, in a dark and superstitious age, long before the birth of our English philosopher and reformer of science. And though both our universities were invited by that great legal, political, and literary character, in terms of the purest friendship and condescension, to change and improve their discipline, and to pursue a method of study less contracted and more liberal, less verbose and contentious, and more rational and philosophical³⁰; it is a truth we have at this day to lament, that this false and feeble plan of study and education has not been publicly expelled, and supplanted by a better: that Aristotle, who exploded

³⁰ *Almæ Matri Inclytæ Acad. Cantabrigiensi. S.*

Debita filii, qualia possum, persolvo; quod vero facio, idem et vos hortor, ut augmentis scientiarum strenue incumbatis, et in animi modestia libertatem ingenii retineatis, neque talentum a veteribus concreditum in sudario reponatis. Affuerit proculdubio et affulserit divini luminis gratia, si humiliata et submissa religioni philosophia, clavibus sensus legitime et dextre utamini; et amoto omni contradictionis studio, quisque cum alio, ac si ipse secum, disputet. Valete.

Inclytæ Academiæ Oxoniensi. S.

Cum, almæ matri meæ inclytæ academiæ Cantabrigiensi, scripserim, deessem sane officio, si simile amoris pignus sorori ejus non deferrem. Sicut autem eos hortatus sum, ita et vos hortor, ut scientiarum augmentis strenue incumbatis, et veterum labores, neque nihil, neque omnia esse putetis; sed vires etiam proprias modeste perpendentes, subinde tamen experiamini, omnia cedent quam optime; si arma, non alii in alios vertatis, sed, junctis copiis, in naturam rerum impressionem faciatis; sufficit quippe illa honori et victoriæ. Valete. Fr. Baconus Verulam.

[To this letter, the University returned a very handsome answer.—See Lord Bacon's Remains, p. 204.—*Editor.*]

all the philosophers before him, is not made to submit, in his turn, to the vicissitude of times and things, and removed from the high seat of penal authority³¹, which he has so long and unjustly held in our universities.

Yet absurd and imperfect as is the ancient discipline, it has still its advocates. To remove prejudices which have been early imbibed, and dispossess inveterate prepossessions, has always been found a task of difficulty. Some appear to think, that to change a constitution literary no less than civil, may be a work of danger. It is the greatest impediment to reform however, that the few who are convinced of its propriety, are not willing to advance, and that what should be the work of all, is the business of none. Hence in the midst of an enlightened and improving age, this dark discipline remains in use, revered by some, contemned by many, and neglected by all. The useless and unwieldy fabric is left to stand an antiquated pile dishonoured and disgraced; over which, as a venerable ruin, it becomes us rather to lament than triumph, and to conceal its particular defects, by quietly removing it, rather than by exposing them to public view.

The consequence is, that the University discipline, in every branch of learning, is forced out of the public, into more private channels. In these every part of a learned and liberal education is cultivated with advantage and inculcated

³¹ Vide Stat. Univ. Oxon. Tit. vi. sect. ii. § 9.

with success. Since the schools were neglected, the colleges have improved. Although the main-spring of the great literary machine be worn out by time, and not yet replaced, there are other wheels in action of far better mechanism improving and to be improved, which move to the honour and advancement of general learning. Still truth obliges us to confess, there is a great defect. The private discipline can never be made to operate with full spirit and effect, unless animated and supported by the public; nor can the other wheels, however excellent in their construction, act with the same harmony and exactness as when kept in motion by one great and central spring.

Truth is the fairest and best apology. The account which I have given of the present state of academical discipline is strictly just, so far as my observations have extended, which have been made with the utmost care and accuracy.

To revise and reform the public discipline of this ancient university is an important task, not less difficult in the execution, than desirable, if well performed; to be undertaken with earnestness, conducted with ability, and pursued with perseverance. That from the joint assistance of scholars and philosophers, not sciolists and pedants, men divested of prejudice on the one hand, and on the other inspired with the love of learning, it may undergo a speedy and effectual renovation; that, under the conduct and direction of the pub-

lic, the private discipline of every college and society may improve and flourish ; and that all places of public institution, both here and every where, devoted to narrow-minded and mercenary views, and which delight in sloth and ignorance, may decay and perish ;—this is an event, which in an enlightened age may be reasonably expected, and the hope which every friend to church and state may ardently entertain.

[The editor feels it due to the public and the university, no less than to himself to state, that he regrets the republication of some part of this “Apology.” It was originally intended, that it should have been altogether withdrawn from this edition ; but he has since felt, that it would be exercising too great a discretionary power on the works of a deceased author to carry this design into effect. The characteristic energy of Dr. Tatham often led him to use somewhat stronger expressions than the occasion would justify ; and both in his censures on the university, and his reply to the late Dr. Knox, we must make considerable allowance for this constitutional zeal and ardour. The animadversions on Dr. Knox are omitted, as they were cancelled in the copy left by the author.]

END OF VOL. I.

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